

Initial Study for the Bay-Delta Marine
Sand Dredging Surface Mining
and Reclamation Plans

Prepared for:

California State Mining & Geology Board

Prepared by:

Office of Mine Reclamation

November 2004

TABLE OF CONTENTS

| <u>Chapter</u> | <u>Page</u> |
|---|-------------|
| 1. INTRODUCTION..... | 1 |
| 2. PROJECT DESCRIPTION | 3 |
| 2.1 Basic Project Information | 3 |
| 2.2 Project Description | 9 |
| 2.3 Sand Mining Project Site History | 12 |
| 2.4 Reclamation | 20 |
| 3. ENVIRONMENTAL CHECKLIST | 24 |
| 3.1 Environmental Factors Potentially Affected | 24 |
| 3.2 Determination | 25 |
| 3.3 Summary of Mitigation Measures | 26 |
| 3.4 Findings Checklist | 30 |
| I. Aesthetics | 30 |
| II. Agricultural Resources | 31 |
| III. Air Quality | 32 |
| IV. Biological Resources | 33 |
| V. Cultural Resources | 42 |
| VI. Geology and Soils | 43 |
| VII. Hazards and Hazardous Materials | 51 |
| VIII. Hydrology and Water Quality | 53 |
| IX. Land Use and Planning | 58 |
| X. Mineral Resources | 59 |
| XI. Noise | 61 |
| XII. Population and Housing | 62 |
| XIII. Public Services | 63 |
| XIV. Recreation | 64 |
| XV. Transportation and Traffic | 65 |
| XVI. Utilities and Service Systems | 67 |
| XVII. Mandatory Findings of Significance | 68 |
| 4. TABLE 1 | 75 |
| 5. SURFACE MINING AND RECLAMATION PLANS FOR BAY-DELTA MARINE SAND DREDGING OPERATIONS..... | 77 |
| I. Hanson Suisun Bay Middle Ground Shoal | |
| II. RMC Suisun Bay Middle Ground Shoal | |
| III. Jerico Suisun Bay Middle Ground Shoal | |

- IV. Suisun Associates Suisun Bay Carquinez West & East
- V. RMC Alcatraz Sand Shoal
- VI. Hanson Point Knox Shoal
- VII. Hanson Alcatraz, Presidio, Point Knox
- VIII. RMC Carquinez Straits
- IX. Hanson Point Knox South
- X. Hanson Alcatraz South Shoal

ATTACHMENT A (Compact Disk format, in pocket)..... 79

The Assessment and Evaluation of the Effects of Sand Mining On Aquatic Habitat and Fishery Populations of Central San Francisco Bay and the Sacramento – San Joaquin Estuary October, 2004. (“**AHFP study**”)

Also available online at <http://www.hansonenvironmentalinc.com> under Report; Sand Report (84.2 MB) and Sand Report Appendices (27.2 MB), October, 2004).

1. INTRODUCTION

This Initial Study was prepared pursuant to the State of California Environmental Quality Act (CEQA) of 1970 (as amended) (California Public Resources Code 21050 *et. Seq.*) in accordance with the State Guidelines for the California Environmental Quality Act (CEQA Guidelines). The proposed project addressed in this Initial Study is the approval and implementation of Reclamation Plans by the State Mining and Geology Board (SMBG) for ten sand dredging operations in the San Francisco Bay-Delta. The Reclamation Plans would be implemented concurrently with ongoing sand dredging operations and would comply with the California Surface Mining and Reclamation Act (SMARA) of 1975.

Although the Bay Conservation Development Commission (BCDC) is the designated SMARA lead agency for the project, without a certified mining ordinance the SMGB becomes the approval agency for the Reclamation Plans, and will act as the CEQA lead agency for this document. Because each site has, or will have prior to further operation, a valid Permit issued by the BCDC, only approval of the Reclamation Plans themselves is under review in this Initial Study.

Initial Study Contents

This Initial Study contains the following sections:

Section 1: Introduction – This section provides an overview of the Initial Study, a description of the CEQA review process and schedule, and CEQA lead agency contact information.

Section 2: Project Description – This section discusses the background of the proposed project, project elements, and required entitlements for project completion.

Section 3: Environmental Checklist – This section contains the Environmental Checklist. The Checklist identifies environmental issue areas that could be affected by the proposed project and lists the determination of whether the project's effect on those areas is significant, less than significant with mitigation, less than significant, or has no impact.

The Checklist also contains the rationale and support for each determination. Section 3 also presents the determination that, based on the results of the Environmental Review, the SMGB has concluded that preparation of a Mitigated Negative Declaration is appropriate to meet the environmental review requirements for the proposed project under CEQA.

Section 4: Surface Mining and Reclamation Plans

This section includes the following Reclamation Plans:

- Hanson Suisun Bay Middle Ground Shoal
- RMC Suisun Bay Middle Ground Shoal
- Jerico Suisun Bay Middle Ground Shoal
- Suisun Associates Suisun Bay Carquinez West & East
- RMC Alcatraz Sand Shoal

Hanson Point Knox Shoal
Hanson Alcatraz, Presidio, Point Knox
RMC Carquinez Straits
Hanson Point Knox South
Hanson Alcatraz South Shoal

Environmental Review Process

This Initial Study and Mitigated Negative Declaration is being circulated for a 30-day public review beginning on December 7, 2004 and ending on January 6, 2005. Attached to the Initial Study and Negative Declaration is a program for monitoring mitigation measures to be considered for adoption with the Mitigated Negative Declaration.

List of Acronyms

| | |
|------------|--|
| AHFP Study | <u><i>The Assessment and Evaluation of the Effects of Sand Mining On Aquatic Habitat and Fishery Populations of Central San Francisco bay and the Sacramento – San Joaquin Estuary</i></u> |
| BCDC | Bay Conservation and Development Commission |
| CCR | California Code of Regulations |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| CY | Cubic Yards (volume) |
| DOC | California Department of Conservation |
| DWR | California Department of Water Resources |
| EPA | California Environmental Protection Agency |
| MLLW | Mean Lower Low Water |
| NEPA | National Environmental Policy Act |
| NOAA | National Oceanographic and Atmospheric Administration |
| OMR | Office of Mine Reclamation |
| PRC | Public Resources Code |
| SLC | State Lands Commission |
| SMARA | Surface Mining and Reclamation Act of 1975 |
| SMGB | California State Mining and Geology Board |
| SWRCB | California State Water Resources Control Board |
| USACOE | United States Army Corps of Engineers |
| USGS | United States Geological Survey |
| USFWS | United States Fish and Wildlife Service |

2. PROJECT DESCRIPTION

2.1 Basic Project Information:

Date: December 6, 2004

Project Title: Approval and Implementation of term-limited Reclamation Plans required under California's Surface Mining and Reclamation Act for ten Bay-Delta Marine Sand Dredging Surface Mining operations as defined by ten individual lease contracts.

Lead Agency and Address: State Mining and Geology Board
801 K Street, MS 20-15
Sacramento, CA 95814

Contact Person and Phone Number: John G. Parrish, Executive Officer
(916) 322-1082

Project Applicants' Name and Address: Hanson Aggregates Mid-Pacific, Inc.
c/o Mr. William H. Butler
3000 Busch Road
Pleasanton, CA 94566
(925) 426-4069

RMC Pacific Materials, Inc
c/o Dennis Tsuchida
6601 Koll Center Parkway, PO Box 5252
Pleasanton, CA 94566
(925) 426-8787

Jerico Products, Inc.
c/o Mr. Christian Lind
100 East "D" Street
Petaluma, CA 94952-3109
(707) 762-7251

Suisun Associates
Hanson Aggregates Mid-Pacific, Inc. and
Morris Tug and Barge
c/o Mr. William H. Butler
3000 Busch Road
Pleasanton, CA 94566
(925) 426-4069

Project Location: Stipulated lease areas in Central San Francisco Bay, Carquinez Strait, and Suisun Bay. (Figures 2.1, 2.2, 2.3, 2.4A, 2.4B).

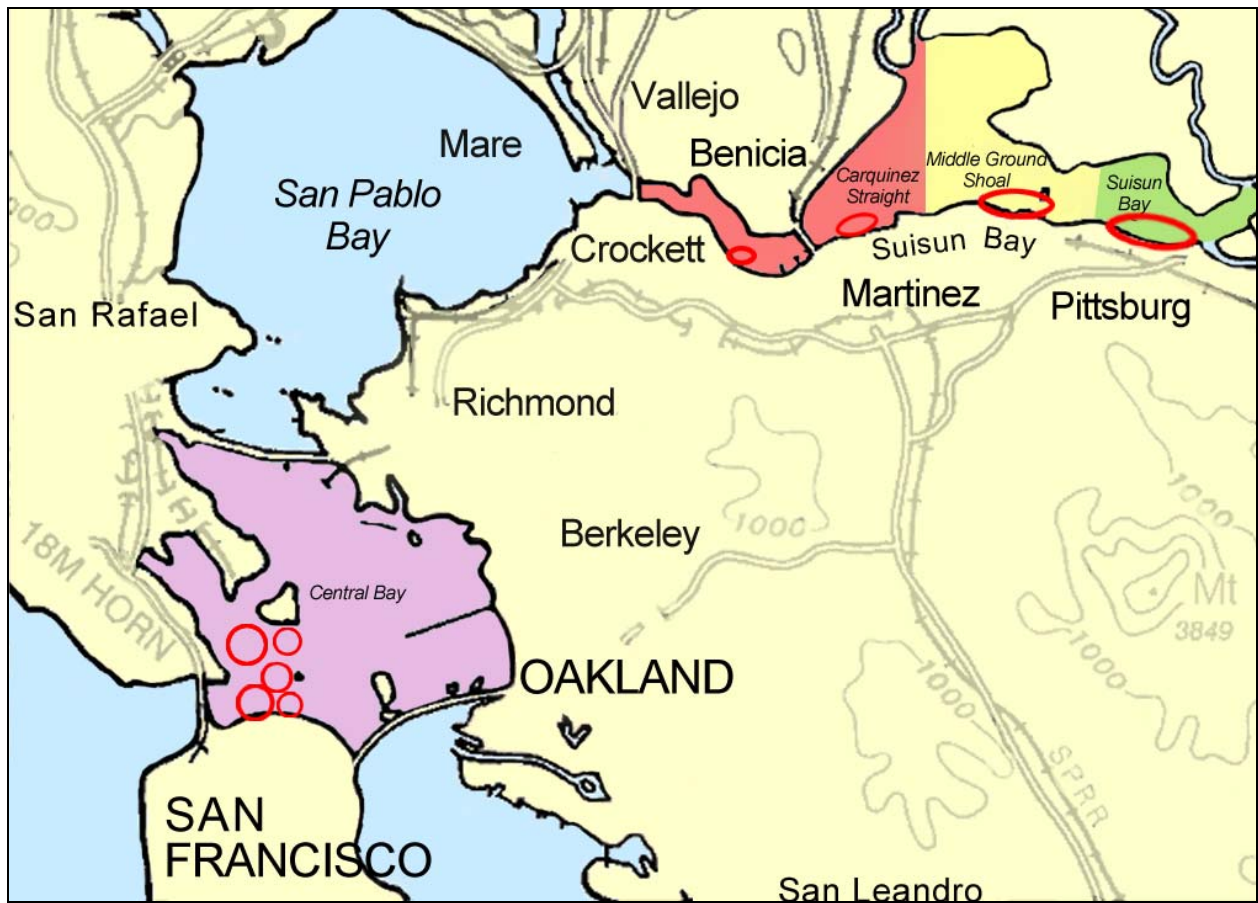


Figure 2-1. Generalized Map of Bay-Delta Marine Sand Dredging Reclamation Plan Locations

North is to top of page. Red circles identify general areas of sand mining activities (circles do not correspond to reclamation plan boundaries). Map not to scale.

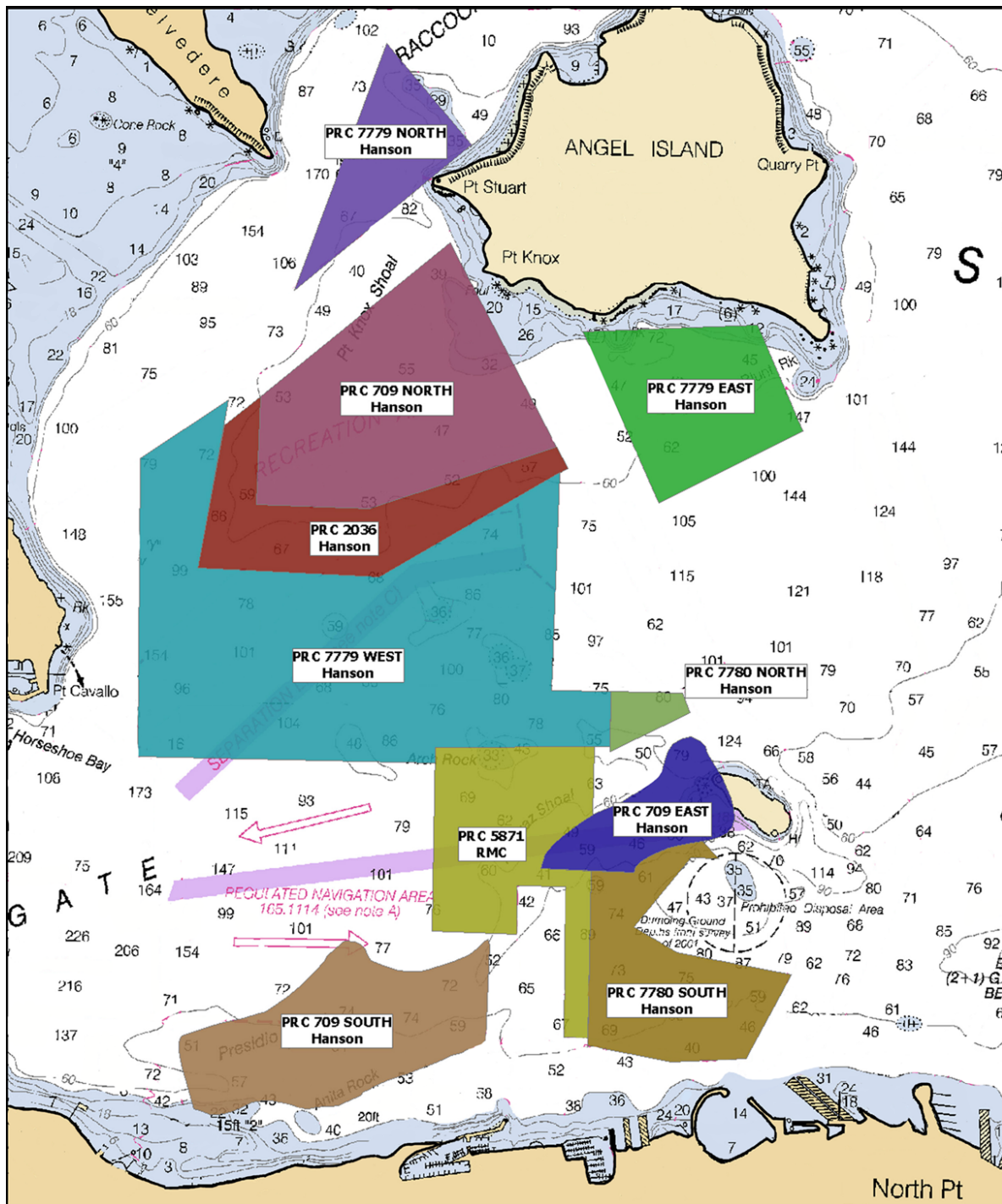


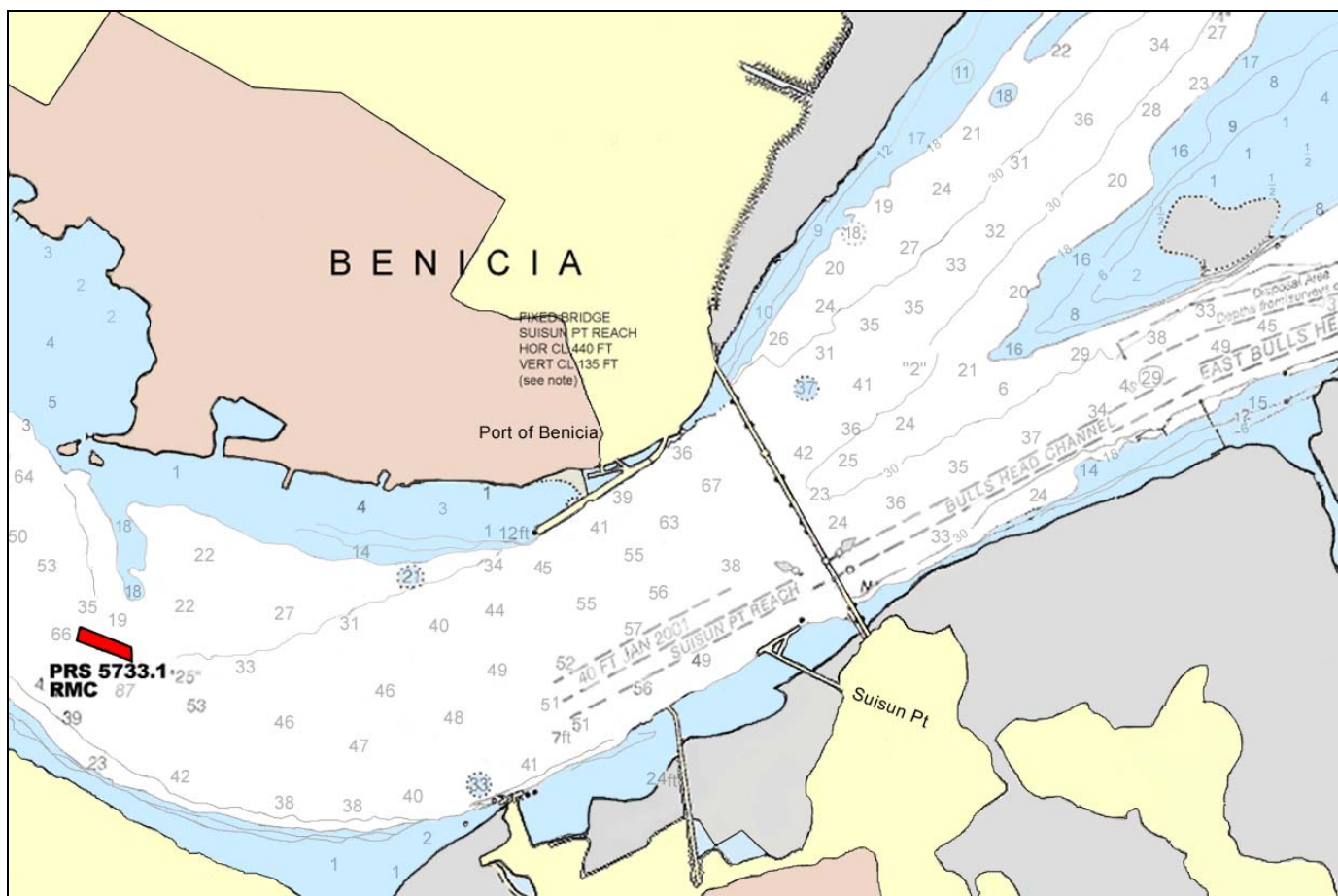
Figure 2-2. Central Bay Marine Sand Dredging Reclamation Plan Locations

Hanson Alcatraz, Presidio, Pt Knox: PRC 709 North, PRC 709 East, PRC 709 South

Hanson Alcatraz South Shoal: PRC 7780

RMC Alcatraz Sand Shoal: PRC 5871

North is to top of page. Map not to scale



North is to top of page. Map not to scale.

North is to top of page. Map not to scale.

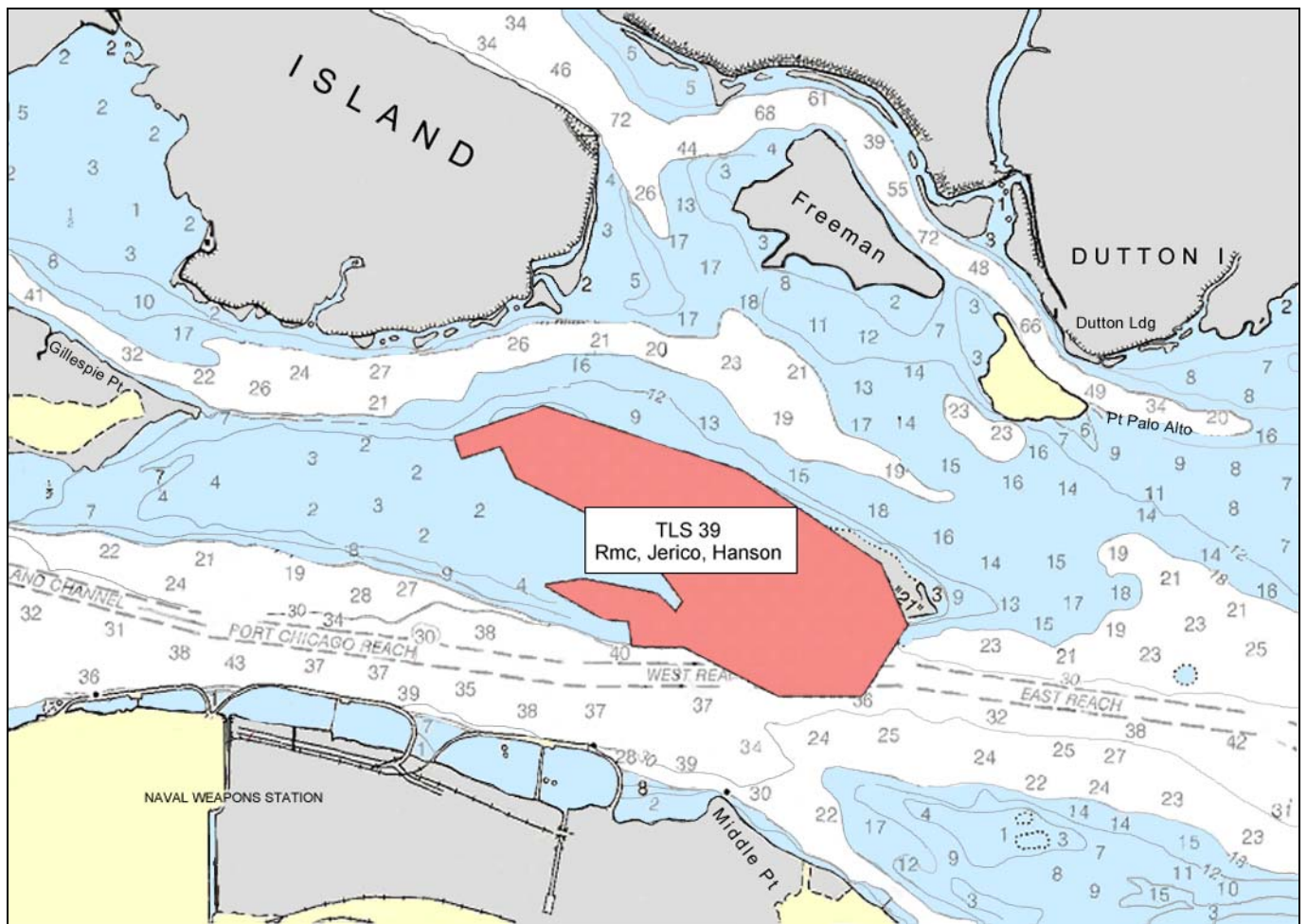


Figure 2.4A. Western Suisun Bay Marine Sand Dredging Reclamation Plan Locations

Hanson Suisun Bay Middle Ground Shoal: TLS 39, Non-exclusive private lease area

Jerico Suisun Bay Middle Ground Shoal: TLS 39, Non-exclusive private lease area

RMC Suisun Bay Middle Ground Shoal: TLS 39, Non-exclusive private lease area

North is to top of page. Map not to scale.

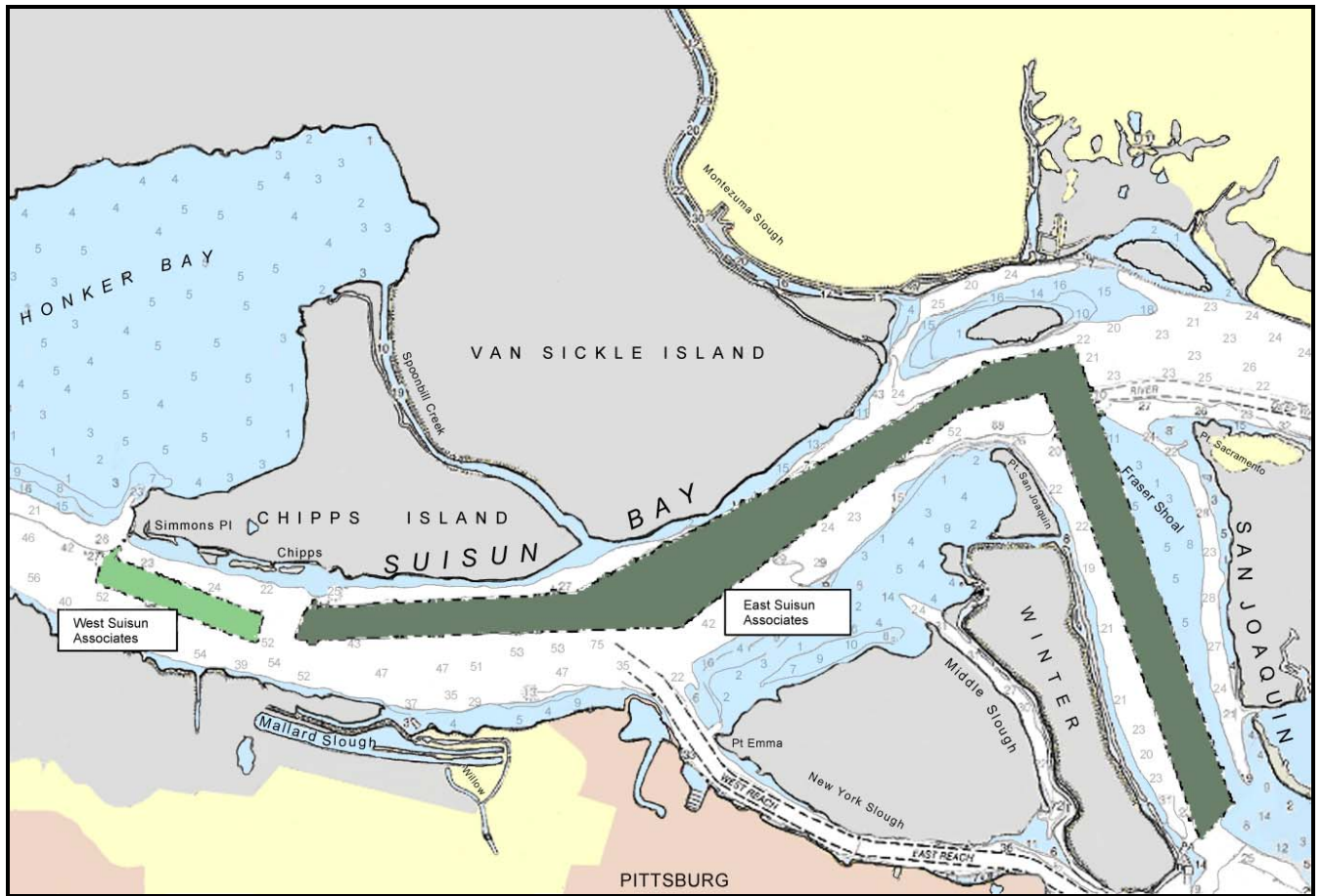


Figure 2.4B. Eastern Suisun Bay” Marine Sand Dredging Reclamation Plan Locations

Suisun Associates Carquinez West and East: West Suisun Associates, East Suisun Associates

North is to top of page. Map not to scale.

Regional Planning:

Bay-Delta development is subject to planning under the authority of the BCDC, established by the McAteer-Petris Act of 1965. The vision for Bay-Delta development is formulated in the subsequent San Francisco Bay Plan of 1969. Water Quality planning for the Bay-Delta is subject to the SWRCB Water Quality Control Plan for the San Francisco Bay – Sacramento San Joaquin Delta Estuary of 1995. The Plans each outline and provide some detail for management of the San Francisco Bay and Bay-Delta, and the subsequent issuance of permits. The Plans set forth goals and protection measures to preserve and enhance the region, recognizing both the environmental importance of the Bay-Delta, as well as the importance of commerce and other critical economic development activities.

The USACOE issues permits based on National Wetlands Policy. These policies are not specific to Bay-Delta projects, but set out guidelines for permitting marine sand mining activities in accordance with rule-based limits and mitigation in place nationwide.

2.2 Project Description:

The Applicants

The project is the approval and implementation of a total of ten term-limited Reclamation Plans for existing marine sand mining operations in the Central San Francisco Bay and the Bay-Delta. The applicants for the project are Hanson Aggregates Mid-Pacific, Inc. ("Hanson"), RMC Pacific Materials, Inc. ("RMC"), Jerico Products ("Jerico"), Suisun Associates ("Hanson" and "Morris Tug and Barge"). Since the Applicants' are currently operating at these sites, or will be operating, under valid permits issued by the BCDC, only the approval of the Reclamation Plans themselves is within the scope of this Initial Study.

The approval and implementation of Reclamation Plans would bring these Applicants' operations into compliance with the Surface Mining and Reclamation Act of 1975 (SMARA) (Public Resources Code Section 2710 et seq.) and the State Mining and Geology Board regulations for surface mining and reclamation practice (California Code of Regulations (CCR) Title 14, Chapter 8, Article 1, Section 3500 et seq.; Article 9, Section 3700 et seq.). The SMARA lead agency for the approval of the project will be the State Mining and Geology Board.

Term Limits, Lease and Permit Renewal

The "term limit" date placed on the plan approval corresponds to the current expiration date of 7 of 10 operations' SLC leases. This date is July 1, 2008. A CEQA analysis will be required prior to approval of new leases by the SLC. New Reclamation Plans conceived to replace the term-limited Reclamation Plans would either be based on that environmental review, or on a separate environmental review.

The remaining three leases are contracted from a private landowner, and expire at different times (**Table 1**). The Reclamation Plans corresponding to these three leases will require extension through the July 1, 2008 date based on renewal of applicable BCDC, USACOE and RWQCB Permits and Orders, and the renewal of the private leases themselves. Renewal of these permits and leases require a separate environmental review.

The renewal or extension of the permits, with specific permit conditions for the marine sand dredging activities, also must be kept current in order for the term-limited reclamation plan mitigation measures to remain intact (**Table 1**). This aspect of the project is discussed in detail below and in Section 4.3, Summary of Mitigation Measures.

Project Leases and Lease Area

The total leased area covers 4,200.4 acres. However, certain near shore and shallow areas within the lease areas are off limits to dredging operations due to permit restrictions, and generally only high velocity current areas that contain suitable commercial-grade sand are dredged. Of the project area, 3,865.3 of the total 4,200.4 acres are State owned property leased to the operators by the SLC. A private area, 3-party lease of 335.1 acres is also included in this project and is located in Suisun Bay.

The seven SLC leases expire in July of 2008. The private leases in Suisun Bay, which are non-exclusive and allow three of the Applicants to operate in the same lease area, each expire on different dates, beginning in September of 2005.

Current CEQA Reviews, Permits and the AHFP study

The existing SLC leases have been subject to CEQA review, and the operations must adhere to the SLC lease conditions. The private property leases are not subject to review by the SLC, however, a CEQA-equivalent analysis was completed by the BCDC prior to the negotiation of the BCDC Permits for the private lease area.

All of the lease operations, including the SLC leases and the private property leases, are also subject to, and have been issued a permit by, both the BCDC and USACOE. In addition to lease and BCDC and USACOE permit requirements, State and Federal water quality laws are enforced by the San Francisco Regional Water Quality Control Board and each operation is subject to a WDR permit or waiver issued by the RWQCB.

Table 1, Bay-Delta Marine Sand Dredging Surface Mining and Reclamation Plans Lease and Permit Requirements, details the current requirements and expiration dates for each of the ten operations. The permit and lease requirements describe restrictions on how the operations are to be conducted, and monitoring programs that must be followed for each operation.

The SMGB approval of the Reclamation Plans would be term-limited to expire with the current leases. Reclamation Plan approvals could be temporally extended on a case-by-case basis at the approval of the SMGB if extension of a lease were negotiated and a CEQA analyses were completed for the new projects. A new CEQA analysis is a requirement of the current SLC leases for any SLC lease extensions. The private leases would also be subject to a CEQA or CEQA-equivalent analysis, if extended.

The SLC leases, USACOE permit and BCDC permit specify an upper limit of dredged sand for each lease, although the lease agreement generally is more restrictive than the Stated permit quantities. The maximum cumulative volume for the entire project is set, by permit, at 2,650,000 cubic yards per year. The actual volume of sand mined in a typical annual cycle, for example from March 2002 through February 2003, has been considerably less than that allowed by permit, at a cumulative total of 1,647,184 cubic yards.

In anticipation of the impending expiration of the current SLC leases in 2008 and the anticipated lease renewal process, the Applicants have worked to prepare a scientific evaluation of the sand dredging activities based on existing literature, reports and information. The study, prepared by Dr. Charles Hanson of Hanson Environmental is entitled: *The Assessment and Evaluation of the Effects of Sand Mining On Aquatic Habitat and Fishery Populations of Central San Francisco bay and the Sacramento – San Joaquin Estuary* (“**AHFP study**”). A final version was completed in October of 2004 (**Attachment A, AHFP study**).

The preparation of the **AHFP study** was provided oversight by representatives from the SMGB, DOC, SLC, RWQCB, USACOE, NMFS, FWS and DFG (Appendix A of the **AHFP study**).

The information collected in the **AHFP study** indicates no significant impact, individual or cumulative, from sand mining in the Bay-Delta estuary has been detected. However, a number of areas were identified for which the existing available information does not detect any impact but is inconclusive. In particular, the temporal and spatial patterns of sand movement in the Bay-Delta, the habitat value of sandy areas to Bay-Delta organisms and the long term impact to the Bay-Delta health is at question. Given the complexity of environmental factors and conditions present, the bio-geographic specificity of many of the available studies present in the literature, and technical limitations, some of the possible impacts resulting from sand dredging operations may be beyond detection. The **AHFP study** identifies additional areas of information, comprising supplemental studies to that available in the existing literature, that

should be considered in completing any further analysis of potential environmental impacts of marine sand mining in the Bay-Delta. These additional areas would be considered prior to consideration of the approval of any of these Reclamation Plans past the proposed projects' term-limits.

The **AHFP study** provides, in part, the basis for some of the current permit requirements for monitoring the operations, and is expected to aid in the preparation of a new CEQA analysis by the SLC in the renewal of the leases in 2008. The **AHFP study** and the current permit approvals provide the basis for this environmental review of the interim reclamation plan approval and implementation project, herein. Renewal of the SLC leases in 2008 will be subject to a new CEQA analysis to be completed by the SLC. Any approval of Reclamation Plans for the Bay-Delta Marine Sand Dredging operations beyond that of the term-limited Reclamation Plans considered in this application will be a separate project that would likely tier on that analysis.

The ten individual Reclamation Plans are included in Section 4 in their entirety. **Attachment A, the AHFP study**, is referenced in, attached to, and an intrinsic part of, the Reclamation Plans. The **AHFP study** discusses, among other things, the comprehensive environmental setting and operational details for all of the dredging activities. The Reclamation Plans generally each differ in their areas of operation, the allowable volume that can be dredged, and the dredging methodology applied; and limits, restrictions and monitoring required, which are also reflected in the leases and multiple agency permits required for the operations. The periodic expiration of the permits has generally resulted in refined conditions that meet current environmental standards, which are included as the permits are updated.

The Reclamation Plans, with the inclusion of the above information, summarily describe how the subject marine sand dredging operations currently are operated to minimize or avoid adverse impacts of mining. All ten plans have similar provisions for operation and reduction or avoidance of potential mining impacts based on the mode of operations and the existing permit restrictions and monitoring. The permit conditions constitute the majority of reclamation practices to be implemented and applied under these term-limited Reclamation Plans. It is anticipated that, as new permits are required, the new permit conditions will be incorporated into the term-limited Reclamation Plans as minor modifications and/or administrative amendments.

Background

Five marine aggregate companies (the "Applicants") currently mine sand commercially by dredge from the San Francisco Bay-Delta (the "Bay-Delta"): Hanson Aggregates Mid-Pacific, Inc. ("Hanson"), RMC Pacific Materials, Inc. ("RMC"), Jerico Products ("Jerico"), Morris Tug and Barge ("Morris") and Suisun Associates (Hanson and Morris). The Applicants' proposed project involves development, approval, and implementation of the surface mining and Reclamation Plans. The individual Reclamation Plans were completed in accordance with the requirements of the Surface Mining and Reclamation Act of 1975 (Public Resources Code section 2710 *et seq.*, hereafter referenced as "SMARA") to satisfy the requirements of SMARA regarding the Applicants' commercial sand mining operations in specified areas of the Bay-Delta.

The Applicants are applying for reclamation plan approval from the State Mining and Geology Board (the "Board"), serving as the SMARA lead agency. The approval and implementation of the Reclamation Plans in the Bay-Delta estuary would allow the Applicants, as part of activities that have been ongoing for decades, to continue to provide construction sand to the Bay Area.

The purpose of marine sand mining is to obtain coarse, mud-free sand, which is primarily used in commercial construction within the greater San Francisco Bay area. Sand obtained from the

Bay-Delta estuary is used, for example, in the construction of freeway systems, commercial buildings, and for construction and seismic retrofitting of bay bridges. Marine sand is mined by dredge from three general regions of the Bay-Delta – the Central San Francisco Bay, Carquinez Strait and Suisun Bay, which includes the Middle Ground Shoal region of western Suisun Bay, and the channels of Suisun Bay and Suisun Bay New York Slough within the eastern portion of Suisun Bay. Sand reserves in these areas are a critically important component of the limited permitted mineral reserves in the Greater San Francisco Bay Area.

The Applicants, under the direction of an oversight committee of State and Federal agencies, completed a study of potential environmental impacts of sand mining in the Bay-Delta estuary (**AHFP study, Attachment A**). The study covers both individual and cumulative environmental effects. The **AHFP study** was conducted by Hanson Environmental. The final rendition of the **AHFP study** was issued in October 2004 after a scientific peer review. Review comments by all the participating agencies have also been incorporated in the study. A copy of the AHFP study is attached as a CD to this document and may also be viewed at the SMGB office, the OMR, SLC, (Sacramento) NOAA (Santa Rosa), BCDC (San Francisco), and online at http://www.consrv.ca.gov/SMGB/special%20reports/special_reports.htm and at <http://www.hansonenvironmentalinc.com> under Report; Sand Report (84.2 MB) and Sand Report Appendices (27.2 MB), October, 2004). The **AHFP study** has identified no significant impact, individual or cumulative, from sand mining in the Bay-Delta.

This Initial Study describes the purpose and need for the marine sand mining operations, the locations of the project sites, including site history and the pre-project environmental setting, as well as how sand mining activities occur. More specifically, this document, together with other application materials, provides the information necessary to enable the SMGB to evaluate the Applicants' proposed Reclamation Plans and the potential environmental effects associated with the whole of the proposed project, which includes the permits and agency approvals required for this project. Potential environmental effects evaluated include on-site or offsite, individual or cumulative, direct or indirect, construction-related or operational impacts. As lead agency, the SMGB must determine whether or not the proposed approval and implementation of the Reclamation Plans will have a significant impact on the environment.

2.3 Sand Mining Project Site History

Marine sand mining has occurred within the Bay-Delta estuary for more than seven decades. Channel and harbor dredging to remove sand and other sediment deposits began in San Francisco Bay in the 1800s. Sand dredging is necessary to keep shipping channels clear from the high-energy sand waves that accumulated on the Bay floor. Since 1800, sand mining has expanded beyond maintenance of shipping channels and, in fact, today maintenance dredging is a distinct process and enterprise. Commercial sand mining – as distinguished from maintenance dredging – began within the Bay-Delta in the 1930s.

Purpose and Need

According to the California Geologic Survey, marine sand mined from San Francisco Bay is a construction product essential to the needs of modern society, providing material for the construction and maintenance of roadways, dams, canals, buildings and other parts of the infrastructure of our State. Construction sand can also be found in our homes, schools, hospitals and shopping centers.

In 2000 and 2001, California consumed from 230 to 240 million tons of construction aggregate annually, a significant component of which is sand. This amount equates to about 7 tons per

person per year for every man, woman, and child in the State. About 43% of construction aggregate is used in public works projects nationwide, and is paid for with tax dollars. The remaining 57% is purchased by private parties and used for residential and commercial building, private roads and other private facilities. Because the cost of transporting construction aggregate is a significant part of the total cost to the consumer, aggregate mines generally are close to communities that consume the aggregate.

Historically, sand has been in short supply. *Aggregate Availability in California*, published in 2002, provides the following information about the permitted supply of construction aggregates in relation to demand:

| Region / County | 50-Year Demand (million tons) | Permitted Aggregate Land Based Resources (million tons) | % of Permitted Aggregates compared to Demand |
|-------------------------|----------------------------------|---|---|
| North San Francisco Bay | 648 | 178 | 27% |
| South San Francisco Bay | 1,213 | 564 | 46% |
| Stockton – Lodi | 337 | 260 | 77% |
| Sacramento – Fairfield | 225 | 130 | 58% |
| Totals | 2,423 | 1,132 | 47% |

Note: This table is derived from Table 1 on page four of the report, which compares 50 years of aggregate demand to permitted aggregate resources as of January 1, 2001. The table was modified to address the Greater San Francisco Bay Area.

Description of Mining Activities

Collectively, Hanson, RMC, Jerico and Morris mine sand commercially by dredging from three general regions within the Bay-Delta, including that of the Central San Francisco Bay, Carquinez Strait and Suisun Bay, which includes the Middle Ground Shoal region of western Suisun Bay, and the channels of Suisun Bay and New York Slough within the eastern portion of Suisun Bay.

The Bay-Delta is owned either by the State of California and held in trust by the State Lands Commission for the people of California (Carquinez Strait, Central San Francisco Bay, part of Suisun Bay), or by private parties in some circumstances (Suisun Bay). The areas where marine sand mining occurs are identified in the respective Reclamation Plans in Section 4, and also in Figure 2.1, 2.2, 2.3, 2.4A and 2.4B using the plans' lease identification numbers. The Applicants anticipate mining the maximum amount of marine sand allowed by the applicable lease and regulatory permits. However, the most restrictive lease or permit allotments constitute the ultimate production limits.

The submerged lands are located at depths of 30 to 90 feet in the Central Bay and at depths of 15 to 45 feet in Carquinez Strait, Middle Ground Shoal, and Suisun Bay. Sand deposits in these areas have a low percentage of fine silts and clay (percentage of fines is typically less than 10%), and frequently are associated with dynamic bed forms, such as sand waves. The sand shoals found in the Bay-Delta estuary are in constant motion and are subject to continual

processes of erosion and deposition caused by the relatively high water velocities of natural flows and currents, especially on the flood and/or ebb tidal cycles.

Mining Methods

There are three general methods of hydraulic sand mining used by the applicants: potholing, trolling, and moving potholing (Figure 2.1). Potholing involves an initial search for an appropriate sand source, followed by "stationary" mining of sand at a site. Potholing operations may involve mining more than one specific location during a mining event, and may involve some movement within a general site. Trolling involves mining while moving over a site, generally working back and forth along parallel pathways between markers. Moving pothole involves mining while moving over a site as well as trying to mine in a stationary position when an appropriate sand source is found.

Potholing involves an initial "searching" for sand with appropriate characteristics (e.g., sand particle size, low percentage (e.g., <10%) of fine-grained sediment, etc.) before the mining itself is initiated. Although the distribution of sand resources is generally well known by the operators, sands of different qualities may be distributed in patches, and operators will initially test a selected site to determine the quality of sand. Tests include visual observations of the slurry (dark color indicates loose or unconsolidated sand) and readings from vacuum gauges. If, at the onset of a mining event, sand quality is not appropriate, the operator will move to another site, and test again. The exact searching and testing process may vary, depending on equipment, the judgment of the operator, and the market for which the sand is destined (and, therefore, the required size or grade of sand).

The mechanical fundamentals of sand mining are similar for potholing, trolling and moving potholing operations. All methods involve use of a tugboat to position and maneuver the hopper barge. Hopper barges may be partially loaded with water prior to mining; some hold their sand cargo below water line requiring them to use nearly their full draft during the entire dredging event which limits the depth at which they can operate. Hopper barges mining sand within the Bay-Delta estuary use suction pumps to harvest the sand from the bottom of the estuary.

The hydraulic suction system used in sand mining (trolling and moving pothole sand mining; consists of a drag arm equipped with drag head, generally mounted on the side of the barge. The drag head is generally fitted with a "grizzly" to screen out oversized material. During a mining event, the drag head is lowered by winches to a depth just above the substrate surface.

Depending on the type of drag head being used, the head may skim across the sediment surface or be buried approximately 12-18 inches beneath the sand surface. During mining using the trolling method the drag head is typically on or near the substrate surface. During mining using the moving pothole method the drag head may be buried under the substrate surface. Stationary potholing involves a different type suction head. Using this suction head allows for sand to be mined without moving the drag head. A suction pipe is used to create the sand-water slurry and the suction head is slowly lowered creating a depression 15 to 20 feet deep into the sand substrate. As sand is pumped to the barge, adjacent sand is mobilized and falls into the pothole created by the suction head.

During sand mining using all three methods, water is forced under pressure through a series of jets (cutter jets) in the drag head, with the jets directed at the substrate. These jets cut into the substrate, suspending sediment in sand-water slurry that is then drawn into the drag head and pumped up to the hopper barge. The proportion of sand to water in the slurry may vary,

depending on equipment and the quality of sand being mined. As sand is mined, the drag head is lowered and/or moved to maintain its position just above or within the substrate.

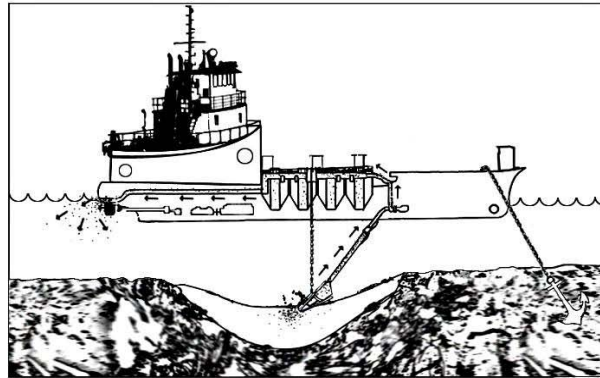
Once the sand-water slurry is pumped to the barge, it is discharged into a long loading chute, running lengthwise along the centerline of the barge. This chute has hydraulically controlled screened openings (gates) at intervals along its bottom, and the sand-water slurry flows through these gates into the barge. Some of the slurry, including aggregate larger than the openings in the screens, is discharged overboard. This discharge may contain aggregates, fine sediments, aeration bubbles, and plankton, and a visible plume is sometimes created around the barge. As the sand displaces water in the barge, the water, fine sediments, aeration bubbles, plankton, and other fine material is discharged forming an overflow plume. Cargo hoppers are also fitted with fine mesh screens along the bottom centerline of the barge where water that has filtered through the sand is also collected and pumped overboard. Based on the equipment and methods used for sand mining within the estuary, commercial sand characteristically ranges in size from approximately 1 mm to 12 mm (1/2 inch), with larger and smaller particles discharged overboard. The volume of sediment discharged overboard during a typical mining event within the estuary has not been quantified.

Hopper barges currently used in sand mining in the Bay-Delta estuary have screened overflow outlets. Water displaced by accumulating sand within the hopper barge, in addition to fine grained sediments and other material, is returned to the receiving waters through either surface discharges and overflow weirs or through subsurface discharges. Hopper barges operated by Hanson Aggregates and RMC, for example, have been modified to include subsurface discharge pipes to release the overflow below the water line. Modifications to these barges to include the subsurface discharge of the overflow plume were intended to help reduce the visibility of the overflow plume and increase the rate of turbulent mixing and dissipation of the overflow plume. The effectiveness of these modifications in reducing overflow plume size or increasing the rate of plume dissipation has not, however, been evaluated. Studies are underway by Minerals Management Service (MMS) to identify modifications to equipment and methods that could be used to reduce and avoid potential adverse impacts to fishery resources and aquatic habitats (i.e., environmentally friendly dredging).¹

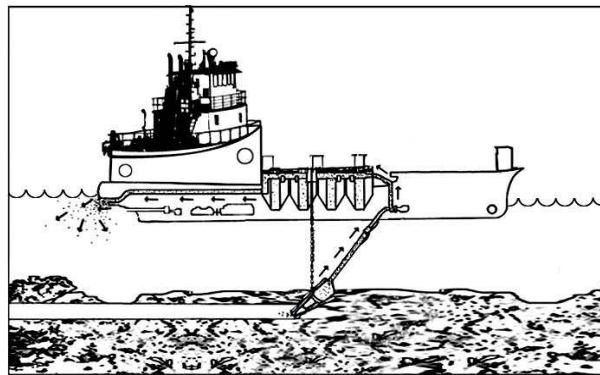
During sand mining, water is drawn into the drag head by the suction pump either from around the sides of the drag head as with equipment operated by Hanson Aggregates or through one or more pipes connected to the suction head as in equipment operated by Jerico, Morris and RMC. Water entrained into the drag head creates the sand-water slurry that allows the sand to be suspended and pumped into the hopper barge. As a result of the need to create the sand-water slurry, the drag head cannot be completely buried into the sand substrate. Cutter jets (high pressure water jets) are used by some operators to loosen and fluidize sand as part of the harvest process. Cutter jets are currently used by RMC as part of stationary pothole mining. Cutter jets are not used by Jerico during trolling. Hanson uses a modified drag head equipped with a water intake pipe to help loosen sediments and fluidize sand during moving pothole mining.

During sand mining using the trolling, moving pothole, or stationary pothole method, the bottom of the drag head is typically located just above the sediment surface or buried approximately 12-18 inches into the bottom substrate. This allows the drag head to continually draw water into the drag head while maintaining sufficient suction to mobilize and transport suspended sand. As the sand is withdrawn from an area, the entire drag head assembly is typically lowered to maintain contact with the substrate.

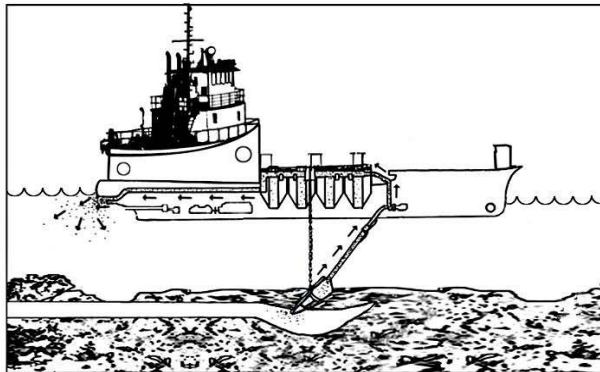
¹ See also AHFP Study, Section 5.12.



A



B



C

Figure 2.1. RMC generally uses a stationary pothole method, Jerico and Morris generally use both stationary potholing and trolling methods and Hanson uses a moving pothole method. Mining methods may change from time to time. Shown are schematic diagrams of the three sand mining methods: (A) stationary pothole, (B) trolling and, (C) moving pothole.

There are numerous variables in the operation of sand mining and offloading equipment, including (a) whether the operation involves potholing, trolling or moving potholing; (b) the water depth in which the tugboat/barge may operate; (c) the maximum and minimum depths to which the drag head may be lowered; (d) percent of sand and water in the slurry created by the operation; (e) the capacity of the barge; and (f) the off-loading method (and thus offloading

facilities that are suitable to the operation). These may vary depending on factors such as the equipment and the quality of sand being mined, as well as other conditions.

Mining Duration and Production Volume

The duration of individual mining events reflect differences in equipment, equipment malfunctions, weather, availability of sand at the selected mining site, and other factors. Sand mining events generally last from 3 to 5.5 hours, with a range of 1 hour to over 11 hours. The range in mining durations reflects, in part, mining events that may have been curtailed by equipment failure or other reasons, or extended for equipment repair.

In Central Bay, the mean duration of mining events is relatively consistent from month to month. During a typical mining period sample (March 2002 through February 2003), Hanson Aggregates mined from 3.5 to 4.6 hours, with a maximum duration of 9 hours and a minimum duration of 1 hour for each mining event. Mean yields from Hanson mining operations were also quite consistent, with monthly means of from 1931 cubic yards per event to 2149 cubic yards per event. Yield per event was most variable during the summer (July and August), when the total number of mining events peaks. RMC mining operations in Central Bay show similar patterns of event duration and yield, except that there is slightly more variation in monthly mean event duration data. Jerico did not mine in Central Bay during the sample period.

Mining events in the Carquinez Strait, Middle Ground Shoal, and Suisun Bay areas show a higher range of event durations, although yield per event was only marginally lower. For Hanson mining operations, the monthly mean event duration during the sample period ranged from 2 hours to 3.1 hours, and no event lasted longer than 7.5 hours. Monthly mean yield per event ranged from 1490 cubic yards to 1768 cubic yards. RMC and Jerico mining operations were more variable in event duration and mining event length was generally longer. For Jerico operations, monthly mean event duration ranged from 4.5 to 7.3 hours, and monthly mean yield per event was 1345 to 1621 cubic yards. For RMC mining, the monthly mean event duration ranged from 2.1 to 7.0 hours, and monthly mean yield per event was 1918 to 2099 cubic yards.

All three operators mine in a pattern to maximize the yield for each dredging event. Additional yield is obtained by increasing the number of events to meet demand within the constraints of the available off-loading facilities. (See **AHFP study**, Section 2.3, **Appendix A** for more detail.)

Water Depth

In Central Bay, sand mining typically occurs in relatively deep water (from 30 to 90 feet deep). Within the region of Middle Ground Shoal and Suisun Bay, sand mining typically occurs in waters 15 to 45 feet deep. Due to equipment constraints, such as the barge and tug draft and the suction drag head minimum operation depth (due to pipe length and angle during operation), sand mining cannot occur in shallow-water areas. For instance, Hanson cannot practically mine in areas with less than 20 feet of water or in areas with depths greater than approximately 80 feet of water. Jerico and Morris do not typically mine in areas less than 15 feet of water or greater than 40 feet of water. RMC cannot practically mine in areas less than 20 feet of water or greater than 90 feet of water (See **AHFP study**, **Attachment A**, for more detail.)

Sand Volumes Harvested by Area

Over the period from March 2002 through February 2003, the total volume of sand harvested was (Table 2-8):

| <u>Location</u> | <u>Cubic Yards</u> |
|------------------------|--------------------|
| • Central Bay: | 1,291,841 |
| • Carquinez Strait: | 33,251 |
| • Middle Ground Shoal: | 225,793 |
| • Suisun Bay: | 96,299 |
| Total: | <hr/> 1,647,184 |

During this period, Central Bay harvest accounted for 80% of total sand mining activity (approximately 1.3 million cubic yards compared to 353 thousand cubic yards from the Carquinez Strait and Suisun Bay). Consistent with data on monthly mining events, the highest monthly harvest in all areas peaked in July and August. The lowest Central Bay monthly harvest was in February 2003, equal to about 53% of the peak harvest in July 2002.

Data on the volumes of sand harvested from various regions of the Bay-Delta estuary reported to the State Lands Commission have been compiled and used to determine how representative sand mining activity during the March 2002 through February 2003 period of this investigation is related to recent mining activity. Data were summarized for calendar years 1999 through 2002 for sand mining activity within Central Bay, Carquinez Strait, and Suisun Bay. These data were compared to sand mining activity during the one-year period of this investigation. Data on sand mining harvest is typically reported as a volume (cubic yards)(cy) at the time of offloading. Since the grain size of sand differs among areas, the actual quantity of sand (weight) and density vary by sand type. In general, coarse sand is assumed to have a mass of 1.5 tons/cy and blend sand is 1.3 tons/cy. Since sand on the bottom may be compacted, and the process of mining may reduce sand density (fluffing of sand as a result of agitation during mining), the density of sand on the estuary bottom is not the same as the sand density at the time of offloading.

Data on sand mining harvest for each of the geographic regions was also compiled on a quarterly basis. Results of these comparisons showed that sand mining activity within Central Bay during the period of this investigation was consistent with recent mining activity over the previous three years. Sand mining within Carquinez Strait has been highly variable over time; however, the volumes of sand harvested during the study period are within the range of recent historic values. Sand mining activity within Suisun Bay during the study period, although slightly lower, was within the same range as previous sand mining activity. Overall, the total volume of sand harvested during the study period was similar to recent previous sand mining activity and therefore, the March 2002 through February 2003 period is considered to be representative of recent sand mining activity within the Bay-Delta estuary (See **AHFP study**, Section 2.3 for more detail).

Daily and Seasonal Schedule of Operations

Although sand mining activity may occur at any time of the day, the operation itself, (i.e., mining the sand and loading the barge), typically lasts on average 3 to 5.5 hours. Once the barge is loaded, it travels to an upland offloading location. Depending on the mining and offloading locations, an entire mining operation can take anywhere from 8 to 24 hours to travel to the

mining location, mine, travel to the offload location and offload. Under these circumstances, from an operational perspective, the same mining vessel could disturb any single area no more than three times in any 36-hour period. In addition, tidal conditions may further reduce the frequency of sand mining operations and disturbance of the sand shoals (for example, the onset of low tide at the time a barge is available to return to the sand shoal could delay the sand mining activity).

Peak mining occurs in July and August, with up to 90 events per month. In these and other months with high total numbers of events, the potential for multiple events in a given day is high. Data on individual mining events during the study period, for all three companies combined, were analyzed to determine the frequency and magnitude of multiple sand mining events within a region of the estuary that affect the area and duration of exposure to the overflow plume. Results of the analysis for Central Bay showed no mining activity during 108 days (30%) and a single mining event on 58 days. Multiple mining events (2-6 events per day) occurred in all months within Central Bay. During the peak months of June, July and August, there were several days when the total number of mining events exceeded the number of tugboat/barge pairs available for mining, suggesting that during periods of peak demand, a single tugboat/barge pair may infrequently conduct two mining operations in a single day.

Multiple-event days are much less frequent in the Carquinez, Middle Ground Shoal, and Suisun Bay areas, reflecting the generally lower level of mining activity in this portion of the Bay-Delta estuary. The three operators combined reported no multiple mining events within Carquinez Strait, five multiple events (2 events per day) at Middle Ground Shoal and two multiple events (2 events per day) within Suisun Bay (See **AHFP study**, Section 2.3, for more detail, **Attachment A**).

Characteristics of the Overflow Plume

During sand mining operations overflow “plumes” of fine suspended sediment and other material (e.g. entrained air bubbles) are created within the water body adjacent to the barge. Sediment plumes caused by sand mining can be defined as those particles suspended into the water column during the sand mining operation that do not rapidly settle following discharge back into the estuary. The degree of suspended sediment, plume size, and concentration and duration of the plume depends on many site and operational specific factors.

Plume Size and Depth

The size and depth of an overflow plume is partly determined by the concentration and grain size (and specific gravity) of sediment particles and other materials discharged as part of the overflow during sand mining. Current velocity and direction also play a large role in determining plume characteristics. The overflow plume dimensions are characteristically narrow, as determined by tide and current velocity. On ebb and flood tides, the plumes are typically narrow in width and long in length. During slack tides, the plumes extend over a wider area and are less drawn out.

Generally the overflow plume during sand mining is approximately 300 feet or less in width and trails away from the sand mining barge with the prevailing water currents (MEC 1990). Plumes generally dissipate within approximately 3000 feet of a sand mining operation. The rate of plume dispersal is related to the settling rate of the particles and turbulent mixing within the receiving waters.

The RWQCB requires a dilution rate of 10:1 to result in sufficient mixing of the turbid overflow water to ambient, clear water quality conditions sufficient to effectively dissipate sediment plumes. Operators are prohibited from discharging plume water into any non-tidal water, dead end slough, similar confined water, or any immediate tributary thereof. The RWQCB also requires each operator to self-monitor plume constituents and collect water samples to avoid release of any contaminated constituents.

2.4 Reclamation

Reclamation is the process that minimizes or avoids impacts to the environment resulting from surface mining activities which, by definition, includes dredging. The reclamation process may extend to the operational aspects of surface mining where activities can be conducted in such a manner as to achieve reclamation goals. The regulation of mining activities pursuant to applicable leases and permits (**Table 1**), the requirements of which are incorporated by reference in the Applicants' Reclamation Plans, provides the principal means of satisfying SMARA's objectives of preventing or minimizing adverse environmental effects of mining and ensuring the protection and subsequent beneficial use of mined land.

Further, as to reclamation requirements themselves, the proposed future use of the sand mining site is as the floor of the Bay-Delta estuary. All sand mining is restricted within the State Lands Commission or private lease boundaries, and each lease and associated permits has an annual limit for the amount of sand that can be mined (**Table 1**). Within these boundaries, sand shoals are located in high velocity current paths, and they are dynamic with significant natural fluctuations.

Since sand mining activity occurs predominately in high-velocity subtidal areas, sand substrates in the areas where mining occurs is characterized predominantly by low percent fines (less than 10%) that reduce the potential for resuspension of chemical contaminants and the exposure of aquatic organisms within the area to potential impacts caused by toxicity. Potential chemical contaminants that may produce lethal effects on aquatic organisms, such as mercury and other toxins that may be associated with fine particle size substrates such as bay mud, have not been found to be absorbed on particles typical of substrates comprised predominately of sand.

Marine sand mining operations do not generate contaminants and are systematically checked for contaminants under Waste Discharge Requirements (WDR's) issued from the SWRCB. Sand mining operations, however, create an overflow plume. The plume is composed of the smaller sized particles, which go into solution during the mining process, and these fines are also returned to the Bay-Delta estuary floor. A description of the process of screening out and returning the oversized material to the Bay and Delta Estuary and the sediment plume are provided in the discussion of mining methods included in the **AHFB study, Section 3.2.6, Attachment A**.

With one minor exception, no mining overburden or waste material is generated. Sand mining operations do encounter cobbles that do not fit the sand profile for fineness, and the cobbles (rocks) are screened out and returned to the Bay-Delta estuary floor.

Sand mining occurs within high-velocity current areas with dynamic substrate movement, areas that are characterized as "naturally disturbed habitats," which further reduces the potential for adverse impacts on fish and macroinvertebrates. As a result of the dynamic nature of water current velocities and sediment movement within subtidal areas of the Bay-Delta estuary, naturally occurring patterns of sediment accretions and depletions limit the stability of subtidal

habitat for benthic macroinvertebrates within high energy areas where much of the sand mining activity occurs, and would contribute to frequent disturbance of benthic macroinvertebrate communities. The frequency and magnitude of benthic disturbance occurring as a result of bed form movement in the form of sand waves and seasonal and interannual variability in accretions and depletions of sand and other sediments within these areas was investigated as part of the **AHFP study**.

Physical limitations imposed by the draft of the tug and barge, in combination with the provisions of applicable permits, which prohibit mining in water depths less than 30 feet mean lower low water ("MLLW") and/or restrict mining within 200 feet of any shoreline or within 250 feet of any water four feet or less at MLLW serve specifically to avoid potential adverse impacts of sand mining activity on shallow-water shoal habitat. Shallow-water shoals are used as foraging and nursery areas for a variety of juvenile fish and macroinvertebrates, and hence restricting the minimum depth where sand mining can occur, avoids potential disturbance and impacts to these habitat areas. Permits authorizing sand mining activity limit the amount of sand that can be harvested on an annual basis, and thereby limit the potential for sand mining activity disturbance to these subtidal aquatic habitats.

No other avoidance actions have been identified to date as being necessary for the protection of subtidal habitat within the Bay-Delta estuary. Sand mined from these areas generally is self-replenishing with the ebb and flood tides through the Golden Gate, and reclamation based on replenishment of sand is occurring constantly and begins again after each mining event. Therefore, the manner planned to return the project sites to their natural use as Bay-Delta estuary floor is by replenishment. This approach of mining in high sediment transport locations is a "reclamation practice" parallel to the "protection of streambeds" which is required in accordance with California Code of Regulations Section 3706(e) and SMARA Section 2772(c)(8)(B) and is the primary reclamation practice for the site specific Bay-Delta environment and for the particular mining practices necessitated by marine sand dredging.

Since the substrate in areas following marine sand mining operations has not been shown by current bathymetric surveys to substantially vary from areas with no mining, no backfilling, grading, or compaction of the filled area is necessary or planned because of the dynamic, natural substrate and associated environment. No revegetation is needed or proposed.

In contrast to land-based operations, there is no equipment left at the sand mining site that will require disposal. All of the sand miners store their tugboats, barges and other mining equipment at appropriately permitted sites in the Bay Estuary. In the unlikely event that a dredge was to sink, the sand mining operator would be responsible to recover the vessel in accordance with applicable legal requirements. This type of event is covered under the sand mining companies' liability insurance policies, and a \$1,000,000 insurance coverage is currently a requirement of all SLC leases. This insurance would cover the cost of the removal of a wrecked vessel named in the policy where removal is required by State or Federal law.

Bathymetric surveys have been conducted in compliance with sand mining permit obligations within Central Bay and Suisun Bay. These bathymetric surveys are intended to provide comparative information on specific locations within the Bay-Delta estuary where results of surveys conducted approximately twice per year have been used to estimate sediment accretion or depletion (e.g., increases or decreases in water depths) on a regional (lease area) geographic scale. As part of this investigation, the available bathymetric survey data have been critically reviewed and reanalyzed.

Through the process of reviewing the existing survey information during the **AHFB study**, a

number of potential refinements or modifications to the bathymetric survey program have been identified to potentially improve the confidence and interpretation of the resulting survey data. Future modification or refinement of the existing bathymetric survey program will be based on the specific objectives of the surveys; the required level of accuracy needed to determine sediment accretion/depletion patterns and trends with an acceptable level of confidence to assess current and potential expansion of sand mining activity; adequacy of the historic and current data to detect and assess biologically significant changes in subtidal benthic habitat for various species of fish and macroinvertebrates; the appropriate frequency and intensity of monitoring to achieve the desired objectives; and the most cost-effective approach for developing the required information. These surveying and replenishment monitoring programs are required in both the BCDC and USACOE permits (**Table 1**). Future modifications of these program requirements have been, and are expected to continue to be, incorporated as permits are updated.

Surrounding Land Uses and Setting:

The Bay-Delta comprises a substantial portion of one of the largest estuaries along the Pacific shore of North America. The Bay-Delta is a partially enclosed body of water formed where fresh water from rivers and streams meet and mix with salt water carried in from the ocean by the daily tides. The estuary provides rich and diverse habitats for aquatic and upland plants and animals that includes tidal flats, tidal marshes, lagoons, managed wetlands, agricultural baylands, salt ponds, wastewater treatment ponds, and riparian forests. Over 137,000 acres of the Bay, its tidal marshes and tidal flats, have been diked from tidal action and include managed wetlands, agricultural baylands, salt ponds and wastewater treatment ponds. These habitats possess a particular importance in replacing original habitats lost with the elimination of the majority of the Bay's historic tidal marsh environment, such as: (1) providing high tide refuge and foraging habitat for species such as shorebirds and the salt marsh harvest mouse; (2) acting as a buffer between remaining tidal marshes, tidal flats and upland uses; (3) creating corridors for wildlife movement between upland habitats and the Bay; (4) retaining stormwater runoff and flood water; (5) filtering sediments and pollutants from stormwater flowing to the Bay; and (6) providing opportunities for recreation, research and education. The Bay-Delta includes a diversity of habitats. These habitats were formed and are sustained by a combination of the global climate and sea level change, and the local effects of topography; the ebb and flow of the daily tides; the volume, timing and location of fresh water inflow; and the availability and types of sediments on the bottom of the Bay and suspended in the water column. Bay habitats include subtidal areas, tidal flats, and tidal marsh; Bay-related habitats include diked baylands, such as salt ponds, managed marsh and agricultural baylands.

Other Public Agencies Whose Approval May Be Required:

As the public lead agency responsible for approving the proposed Reclamation Plans, the SMGB is the Lead Agency under CEQA, and is responsible for reviewing and certifying the adequacy of the environmental document and approving the proposed project. It is anticipated that the SMGB would consider approval of the ten individual Bay-Delta Marine Sand Dredging Surface Mining and Reclamation Plans included as Section 4 of this document upon review and adoption of this Mitigated Negative Declaration.

Responsible agencies under CEQA for the 2008 lease renewal and associated permits will include the State Lands Commission ("SLC"), Bay Conservation Development Commission ("BCDC"), and the San Francisco Regional Water Quality Control Board ("RWQCB").

Commenting agencies include the Bay Area Air Quality Management District (“BAAQMD”), California Department of Fish and Game (“DFG”), Federal Fish and Wildlife Service (“FWS”) and the National Marine Fisheries Service (“NOAA Fisheries”).

In developing these State and Federal permits, the agencies will consider the potential for sand mining activity cause changes to the physical environment that may have adverse impacts to the fish and macroinvertebrate communities inhabiting the estuary and to potential physical changes that sand mining activity may cause, directly, indirectly, or through cumulative effects to habitat quality and availability for fishery resources in the estuary. Specifically, State and Federal resource agencies evaluate the potential for sand mining to result in adverse impacts to:

- Fish species listed for protection under the California and/or Federal Endangered Species Acts;
- Species of special concern;
- Regions of the estuary designated as critical habitat for listed species; and
- Essential Fish Habitat (EFH) for managed species which support commercial and/or recreational harvest as identified through resource management plans adopted by the Pacific Fisheries Management Council (PFMC) and managed under the authority of NOAA Fisheries.

The synthesis of available scientific information is needed by these resource and regulatory agencies and the marine aggregate industry as a foundation for identifying appropriate terms and conditions for permits authorizing existing sand mining activity within the estuary that will provide an appropriate level of protection for water quality, aquatic habitat, and the fish and macroinvertebrate communities that inhabit the estuary. These permits and conditions are reflected in the Reclamation Plans considered by the SMGB.

3. ENVIRONMENTAL CHECKLIST

3.1 Environmental Factors Potentially Affected

No environmental factors have been checked below. With the mitigation proposed, no significant impacts would be expected to occur because of the approval and adoption of any or all of the 10 Reclamation Plans considered as part of the project. Each of the potential impact areas is discussed in the checklist on the following pages.

- | | | |
|--|---|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Agriculture Resources | <input type="checkbox"/> Air Quality |
| <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Cultural Resources | <input type="checkbox"/> Geology /Soils |
| <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology / Water Quality | <input type="checkbox"/> Land Use / Planning |
| <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Noise | <input type="checkbox"/> Population / Housing |
| <input type="checkbox"/> Public Services | <input type="checkbox"/> Recreation | <input type="checkbox"/> Transportation/Traffic |
| <input type="checkbox"/> Utilities / Service Systems | <input type="checkbox"/> Mandatory Findings of Significance | |

3.2 Determination:

On the basis of this initial evaluation:

3.2 Determination:

On the basis of this initial evaluation:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- ☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

John G. Smith

Date

December 6, 2004

3.3 Summary of Mitigation Measures

This section is a summary of the mitigation measures identified and further described in Section 3.4, which follows this Section.

Mitigation Measure 1A (Biological Resources)

The RWQCB Order applicable to the following operations in the Suisun Bay requires that each applicant implement depth and setback limitations to ensure shallow water habitat is avoided in the Suisun Bay.

- Hanson Suisun Bay Middle Ground Shoal
- RMC Suisun Bay Middle Ground Shoal
- Jerico Suisun Bay Middle Ground Shoal

In order to approve the reclamation plan, these setback restrictions in the current Order shall be followed.

- Marine sand dredging is prohibited within 200 feet of any shoreline and within 250 feet of any water less than four feet in depth (MLLW).

To extend the acceptance of Reclamation Plans past the expiration of the current Order (see **Table 1**) the Order must be reissued and the same, or parallel restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Order prior to the expiration of the current Order and present it to the SMGB for acceptance.

Mitigation Measure 1B (Biological Resources)

The USACOE Permit and/or the BCDC permit permits applicable to the following operations in the Central Bay require that each applicant implement depth and setback limitations to ensure shallow water habitat is avoided in the Central Bay. In order to approve the reclamation plan, these setback restrictions shall be followed.

- Hanson Point Knox Shoal; 30-foot MLLW water depths, or greater
- Hanson Alcatraz, Presidio, Point Knox: 200 feet away from any shoreline, or more, and 250 feet from 4-foot MLLW shoals, or greater **or** 100 feet, or more, of Alcatraz Island and 30 foot MLLW, or greater
- Hanson Point Knox South: 30-foot MLLW water depths, or greater
- Hanson Alcatraz South Shoal: 30-foot MLLW water depths, or greater.

To extend the acceptance of Reclamation Plans past the expiration of the current permits (see **Table 1**) the permits must be reissued and the same, or parallel permit restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

Mitigation Measure 2A (Geological Resources)

Accelerated loss of substrate through mining and lack of replenishment of substrate during the reclamation process would be the main concern in terms of the projects' impacts on the geologic environment. High velocity current areas in the Bay-Delta receive sediment at high rates compared to low velocity current areas. Existing and subsequent USACOE and BCDC permits require the following depth restrictions on the following dredging locations in the Suisun Bay. The same restrictions that will avoid dredging activities in fine-grained substrates will also tend to focus dredging at high velocity sand substrates.

- Operators shall implement the following depth limitations for sand dredging activities in the Middle Ground Shoal area in Suisun Bay.
 - Hanson Suisun Bay Middle Ground Shoal
 - RMC Suisun Bay Middle Ground Shoal
 - Jerico Suisun Bay Middle Ground Shoal

Marine sand dredging is prohibited within 200 feet of any shoreline and within 250 feet of any water less than four feet in depth (MLLW).

To extend the acceptance of Reclamation Plans past the expiration of the current permits (see **Table 1**) the permits must be reissued and the same, or parallel permit restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

Mitigation Measure 2B (Geological Resources)

Accelerated loss of substrate through mining and lack of replenishment of substrate during the reclamation process would be the main concern in terms of the projects' impacts on the geologic environment. High velocity current areas in the Bay-Delta receive sediment at high rates compared to low velocity current areas. Existing and subsequent USACOE and BCDC permits require the following depth restrictions on the following dredging locations in the Central Bay. The same restrictions that will avoid dredging activities in fine-grained substrates will also tend to focus dredging at high velocity sand substrates.

- Only high velocity current areas in the Bay-Delta shall be dredged. Current and subsequent permits must continue to require depth limitations on the dredging locations. USACOE Permit, or in the BCDC permit current to the following Reclamation Plans in the Central Bay.
 - Hanson Point Knox Shoal; 30-foot MLLW depth.
 - Hanson Alcatraz, Presidio, Point Knox: 200 feet from any shoreline and 250 feet of 4-foot MLLW shoal depths **or** 100 feet of Alcatraz Island and 30 foot MLLW depth.
 - Hanson Point Knox South: 30-foot MLLW depth.
 - Hanson Alcatraz South Shoal: 30-foot MLLW depth.

To extend the acceptance of Reclamation Plans past the expiration of the current permits (see **Table 1**) the permits must be reissued and the same, or parallel permit restrictions similar to the

current protections, substituted. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

Mitigation Measure 2C (Geological Resources)

Accelerated loss of substrate through mining and lack of replenishment of substrate during the reclamation process would be the main concern in terms of the projects' impacts on the geologic environment. A cap on the volume of sand that may be dredged in accordance with the most restrictive current permits and/or lease shall be observed.

- Leases and permits all have not-to-exceed annual production volumes. No substantial increase in production volumes, defined as a 5% increase of the total in any single lease may occur. The approval of the leases not subject to SLC renewal (and may therefore expire prior to the term-limited Reclamation Plans) will have volume restrictions based on the most limiting permits requirements. Currently these are:
 - Hanson Suisun Bay Middle Ground Shoal: 450,000 cubic yards per year (based on the combined total of the USACOE Permits).
 - RMC Suisun Bay Middle Ground Shoal: 250,000 cubic yards per year (based on both the USACOE and BCDC Permits).
 - Jerico Suisun Bay Middle Ground Shoal: 250,000 cubic yards per year (based on USACOE, BCDC Permits and the Grossi Lease).

To extend the acceptance of Reclamation Plans past the expiration of the current permits (see **Table 1**), the permits must be reissued with volume restrictions within 5% of the current permits. The operator must secure a valid extension of the Permits prior to the expiration of the current Permits and present them to the SMGB for acceptance.

Mitigation Measure 2D (Geological Resources)

Accelerated loss of substrate through mining and lack of replenishment of substrate during the reclamation process would be the main concern in terms of the projects' impacts on the geologic environment. Tracking the substrate elevations using available technical improvements of bathymetric surveying techniques will continue to be incorporated with the guidance of the BCDC, USACOE and other permitting agencies through the lease and permit process.

- Improvement of the precision, accuracy and potential usefulness of the bathymetric data collected using adaptive management of permits and leases will continue.

Mitigation Measure 3 (Hydrology and Water Quality)

The RWQCB, through issuing a general Waste Discharge Requirement permit, has determined that the overflow plume from sand mining generally does not cause waters of the State to exceed the following quality limits downstream of the zone of discharge:

- Dissolved Oxygen: 5.0 mg/l minimum;
- Dissolved Sulfide: 0.1 mg/l maximum; and
- Toxic or other deleterious substances: None are present in concentrations or quantities that could cause deleterious effects on aquatic biota, wildlife or waterfowl,

or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

However, the RWQCB require that self-testing of the plume and ambient waters be conducted to ensure this premise is correct.

- The operators shall observe RWQCB Order #95-177 and its amendments, which require a self-monitoring program be in place to insure continued observation of a 10:1 plume dissipation requirement criteria.

To extend the acceptance of Reclamation Plans past the expiration of the current Orders (see **Table 1**) the Orders must be reissued and the same, or parallel restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Order prior to the expiration of the current Order and present it to the SMGB for acceptance.

Mitigation Measure 4 (Recreation)

Recreational fishing may be impacted by the operation of dredging equipment during certain time or in specific areas.

- BCDC Permits require that all operations consult with DFG to avoid interference with popular fishing areas and recreational boating and fishing activities, and that sand mining on weekends and holidays will not conflict with these activities. This shall apply to all operators. This provision is currently required in all the operations' BCDC permits (except for RMC Suisun Bay Middle Ground Shoal).

To extend the acceptance of Reclamation Plans past the expiration of the current permit (see **Table 1**) the permit must be reissued and the same, or parallel permit restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

Mitigation Measure 6 (Mandatory Findings of Significance)

The information collected in the **AHFP study** indicates no significant impact, individual or cumulative, from sand mining in the Bay-Delta estuary has been detected. Given the complexity of environmental factors and conditions present, the bio-geographic specificity of many of the available studies present in the literature, and technical limitations, some of the possible impacts resulting from sand dredging operations may currently be beyond detection.

A number of areas were identified for which the existing available information does not detect any impact at this time, but could eventually be detected as a cumulative impact over a long time period. The **AHFP study**, Section 9.0, identifies additional areas of information, comprising supplemental studies to that available in the existing literature, that should be considered in completing any further analysis of potential environmental impacts of marine sand mining in the Bay-Delta. These additional areas would be considered in an independent environmental analysis prior to consideration of the approval of any of these Reclamation Plans past the proposed projects' term-limits.

- Mitigation will require that all of the Reclamation Plans considered in this project are limited in term to expire on July 1, 2008. Time extension of approval of any of the Reclamation Plans would further evaluate cumulative and long-term impacts, particularly

in the area of substrate monitoring and accretion and depletion of the substrate.

- Additional lease areas shall not have new Reclamation Plans approved without an independent environmental analysis.
- Mitigation will require that cumulative volumes of sand dredged will not significantly increase during the approval period for the term limited Reclamation Plans without an independent environmental analysis.

3.4 Findings Checklist:

I. AESTHETICS

Environmental Setting

The presence and operation of sand dredges in the Bay-Delta is intermittent and generally blends with other types of Bay-Delta commercial boating activities.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) Have a substantial adverse effect on a scenic vista? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Substantially degrade the existing visual character or quality of the site and its surroundings? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

The turbidity cloud dispatched to clear Bay-Delta waters from an individual dredge is short lived due to the 10:1 dilution requirement imposed by the RWQCB and is visible by relatively few nearby vessels. The presence of a dredge does not differ significantly from the presence of any other type of vessel present in the Bay-Delta, none of which are particularly prominent or imposing. Most receptors are distant from the dredging activities.

There are no other potential aesthetic issues associated with bay sand dredging operations or Reclamation Plans.

Impact Analysis

No impacts are anticipated by the approval and implementation of the Reclamation Plans and no mitigation is required.

II. AGRICULTURAL RESOURCES

Environmental Setting

Terrestrial farming activities are not a part of the Bay-Delta marine sand mining reclamation plan implementation and approval.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| Would the project: | | | | |
| a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Conflict with existing zoning for agricultural use, or a Williamson Act contract? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

No terrestrial farmland will be affected by sand dredging in the Bay-Delta and therefore no impact to Williamson Act contracted lands or Prime Farmland will be encountered. No aquaculture or fish farming activity is present in the Bay-Delta and therefore these classes of "farming" would not be impacted by sand dredging activities. Tidal estuary settings and would not be impacted by Bay-Delta Marine Sand Dredging activities.

Impact Analysis

No impact on farmland is anticipated and no mitigation is required.

III. AIR QUALITY

Environmental Setting:

Approval and implementation of the Reclamation Plans would have not impact on air quality.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| a) Conflict with or obstruct implementation of the applicable air quality plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Expose sensitive receptors to substantial pollutant concentrations? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Create objectionable odors affecting a substantial number of people? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Project approval would result in no change to the existing air quality environment.

Impact Analysis

Reclamation plan approval would result in no significant impact on air resources. No mitigation for air quality impacts is needed.

IV. BIOLOGICAL RESOURCES

Environmental Setting

The subtidal areas of the Bay encompass the land and water below mean low tide and are intricately tied to tidal flats and tidal marshes and are also linked to diked former parts of the Bay such as salt ponds, managed wetlands, agricultural baylands, and adjacent upland habitats. These areas include both shallow and deep segments of the Bay and are important for fish, other aquatic organisms and wildlife, such as bottom-dwelling benthic organisms, seabirds, waterfowl and some mammals, such as harbor seals, that move back and forth between deep and shallow water. The Bay's subtidal areas also serve as a corridor for fish, other aquatic organisms and wildlife species moving between the Ocean and the Delta and other local rivers and streams entering the Bay.

- The Bay-Delta estuary supports an abundant and diverse community of fish, macroinvertebrates, and other aquatic resources;
- The Bay-Delta estuary is a highly disturbed ecosystem, affected by the introduction of exotic species, changes in shoreline environments, pollution, channel dredging, and hydrology/outflow regimes. These and other factors have resulted in significant changes in aquatic habitats and in the composition of the aquatic faunal community;
- Areas within the estuary where sand mining occurs also serve as spawning, rearing, foraging, holding, and migrating habitat for various species of estuarine and marine fish and macroinvertebrates;
- There are commercially and recreationally important fish and invertebrate species in the vicinity of sand mining operations in the Central Bay, Carquinez Strait and Suisun Bay.
- There is within-year and among-year variation in species composition, relative abundance, and geographic distribution of various marine and estuarine fish species inhabiting the Bay-Delta.
- Aquatic plants occur within the intertidal and shallow subtidal zones of both Central Bay and the Suisun Bay complex. Within Central Bay localized, shallow water subtidal areas have been colonized by eelgrass that serves important habitat and ecological functions within the estuary. Further upstream within the Suisun Bay complex shallow-water channel margins have been vegetated by tules and a variety of other vascular plants. As a consequence of the relatively high turbidity and suspended sediment concentrations naturally occurring within the Bay-Delta estuary light penetration (photic zone) limits the occurrence of aquatic and emergent vegetation to relatively small, shallow-water areas within both Central Bay and further upstream within the estuarine portion of the Suisun Bay complex.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulation or by the California Department of Fish and Game or US Fish and Wildlife Service? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Species Composition²

Results of the analysis of fishery catch statistics based upon otter trawl, midwater trawl, and plankton surveys conducted by CDFG at selected sampling stations located within San Francisco Bay and Delta over the 21 year period between 1980 and 2001, have led to the following conclusions:

- The Bay-Delta estuary supports an abundant and diverse community of fish, macroinvertebrates, and other aquatic resources;
- The Bay-Delta estuary is a highly disturbed ecosystem, affected by the introduction of exotic species, changes in shoreline environments, pollution, channel dredging, and hydrology/outflow regimes. These and other factors have resulted in significant changes in aquatic habitats and in the composition of the aquatic faunal community;
- Areas within the estuary where sand mining occurs also serve as spawning, rearing, foraging, holding, and migrating habitat for various species of estuarine and marine fish and macroinvertebrates;
- There are commercially and recreationally important fish and invertebrate species in the vicinity of sand mining operations in the Central Bay, the most frequently occurring being³:
 - (1) Northern anchovy;
 - (2) Dungeness crab;
 - (3) Two species of bay shrimp;
 - (4) California halibut;
 - (5) Pacific herring;
 - (6) Striped bass; and
 - (7) Chinook salmon.
- There are commercially and recreationally important fish and invertebrate species in the vicinity of sand mining operations in the Carquinez Strait, the most frequently occurring species being⁴:
 - (1) Northern anchovy;
 - (2) Pacific herring;
 - (3) Dungeness crab;
 - (4) Two species of bay shrimp;
 - (5) Striped bass; and
 - (6) White sturgeon.
- There are commercially and recreationally important fish and invertebrate species in

² See also AHRP Study, Section 5.12.

³ Other potentially important commercial and recreational species did not represent a significant percentage of the Central Bay aquatic community composition, based on CDFG surveys.

⁴ Other potentially important commercial and recreational species did not represent a significant percentage of the Carquinez Strait aquatic community composition, based on CDFG surveys.

the vicinity of sand mining operations in Suisun Bay (Middle Ground and Suisun Bay Channel), including⁵:

- (1) Northern anchovy;
 - (2) Striped bass;
 - (3) American shad;
 - (4) Chinook salmon;
 - (6) Dungeness crab;
 - (7) California bay shrimp;
 - (8) White catfish; and
 - (9) White sturgeon.
- There are special status species in all current sand mining locations. Based on CDFG surveys:
 - (1) Longfin smelt are a substantial component of Bay-Delta aquatic communities from the Central Bay to Middle Ground Shoal;
 - (2) Delta smelt, absent from the Central Bay and infrequently found in Carquinez Strait and Middle Ground Shoal, are more frequently found in Suisun Bay;
 - (3) Emigrating Chinook salmon juveniles are found in all sand mining areas;
 - (4) Splittail are absent from the Central Bay and become more abundant upstream of Carquinez Strait;
 - (5) Green sturgeon and steelhead trout may be found in sand mining areas, but their percent composition of the aquatic community may be low in these areas; and
 - (6) Coho salmon and tidewater gobies do not appear to be present in areas where sand mining occurs.
 - The potential for sand mining to impact these species will be site specific and will vary daily, seasonally, and annually;
 - In the Central Bay, subtidal habitats directly affected by sand mining (e.g., benthic disturbance) consist primarily of deepwater benthic habitats generally with low vegetation and detritus;
 - In upstream mining locations, commercial sand dredging mining occurs in open navigation channel locations and generally affects channel bottom substrates. Sand mining does not occur in shallow water subtidal and intertidal habitats;
 - There is within-year and among-year variation in species composition, relative abundance, and geographic distribution of various marine and estuarine fish species inhabiting portions of San Francisco Bay-Delta estuary in areas where sand mining occurs. Species composition within the sand mining area was observed to vary within and among years based upon results of the CDFG surveys;
 - Based on the different communities captured by otter trawl and midwater trawl methods, and differences in aquatic community composition within the four areas where sand mining occurs, the species composition and abundance (density) of fish

⁵ Other potentially important commercial and recreational species did not represent a significant percentage of the Suisun Bay aquatic community composition, based on CDFG surveys.

species varies in response to factors such as water depth, substrate, and salinity;

- Intra- and interannual variability in abundance (density) of various fish species was observed to be relatively high for many species, based upon data collected by CDFG; and
- Data from the three CDFG surveys and other scientific investigations conducted within the estuary provide valuable insight into the occurrence, geographic distribution, and habitat use, and provide the necessary scientific and technical foundation for assessing potential adverse effects associated with sand mining on fish and macroinvertebrate communities within various regions of the estuary.

Species Use (Abundance) within the Area⁶

Information on the geographic distribution and habitat use by various fish and macroinvertebrate species shows that many species occupy subtidal habitats where sand mining activity occurs within Central Bay, Carquinez Strait, Middle Ground Shoal, and Suisun Bay channels.

Habitat usage patterns for some species, such as Pacific herring spawning and rockfish/lingcod are not concentrated in areas within Central Bay where sand mining activity occurs and hence there would be a minimal risk of direct and indirect impacts on these species and lifestages. For a number of other species, such as Chinook salmon, steelhead, striped bass, delta smelt, Sacramento splittail, northern anchovy, shiner perch, California halibut, bay shrimp, and Dungeness crab, sand mining within various regions of the estuary occurs within areas utilized by these species and hence their vulnerability to direct and indirect impacts resulting from sand mining could be increased. Potential impacts of sand mining on these species and their habitat would include entrainment into the suction head, and exposure of sensitive species or lifestages to temporary, localized, increases in suspended sediment concentrations as results of both benthic disturbance and exposure to the overflow plume.

Direct impacts of sand mining on subtidal habitats, such as rock outcroppings and other hard substrate, are not expected to occur as a result of the active avoidance by sand miners of shallow habitat areas (e.g., less than 30 feet within Central Bay and 9 feet within the Suisun Bay complex), and rock outcroppings and other structures that could damage mining equipment.

Many of the species inhabiting the Bay-Delta estuary are tolerant of highly variable environmental conditions, including exposure to elevated suspended sediment concentrations and other habitat disturbances, and therefore would not be expected to be adversely affected by sand mining activity. Potential adverse affects of sand mining activity would primarily focus on the early lifestages of species that could be vulnerable to entrainment into the suction head during sand mine sand commercially by dredge and/or exposure of sensitive species and lifestages, such as northern anchovy, to localized temporary increases in suspended sediment concentrations. The benthic disturbance resulting from sand mining on habitat conditions and predator-prey relationships are difficult to interpret since benthic disturbance could result in localized areas of organic material accumulations that could attract and benefit detritivores and/or reductions or changes in benthic macroinvertebrate species composition and abundance that could result in increases or decreases in prey availability for various species.

⁶ See also AHFP Study, Section 7.11.

Based on the co-occurrence of various fish species and macroinvertebrates within areas where sand mining activity occurs it would be expected that mining activity would result in an incremental increase in mortality resulting from entrainment, primarily of planktonic eggs and larvae, and early juvenile lifestages, short-duration localized changes in distribution and habitat usage by sensitive species in response to exposure to elevated suspended sediment concentrations, and short-duration localized changes in predator-prey dynamics in response to increased turbidity and suspended sediment concentrations. Localized changes in predator-prey dynamics could include both reductions in feeding success by juvenile and adult fish foraging on zooplankton and also reduced vulnerability of fish to predation by larger fish, birds, and mammals. Although sand mining activity would be expected to contribute to incremental adverse effects on sensitive species, the relatively small proportion of the Bay-Delta estuary affected by sand mining activity, and the relatively wide geographic distribution of habitat use by many of the species, suggests that these incremental effects would not be expected to result in significant adverse impacts to the overall regional population dynamics of these species. The potential for these incremental effects to combine with the impacts of other projects and thereby cause or to contribute to cumulative effects on habitat quality and availability and population dynamics of various species is discussed below (Section 3.4 XVII).⁷

Entrainment in the Dredge System⁸

Much of the available evidence suggests that entrainment does not pose a risk of significant impact for many species of fish, shrimp and crabs in many bodies of water that require periodic dredging.

Based on information from the literature, it was concluded that entrainment for various species does occur during maintenance dredging operations. No studies have been conducted within the Bay-Delta estuary to evaluate entrainment of fish, crabs and shrimp. Results from studies conducted within the Pacific Northwest and elsewhere have demonstrated entrainment of a variety of species including juvenile Dungeness crab, bay shrimp, northern anchovy, Pacific herring, starry flounder, English sole, sand sole, Pacific sanddab, speckled sanddab, Pacific staghorn sculpin, kelp greenling, lingcod, surfperch, smelt, juvenile sturgeon, and juvenile salmon. It is also expected that sand mining within the Bay-Delta estuary would result in entrainment of planktonic fish eggs and larvae. The available information on entrainment is largely derived from maintenance dredging activity conducted using a hydraulic suction head, which may not be representative of entrainment vulnerability to sand mining techniques employed within the Bay-Delta estuary. Analyzing the potential adverse effects of entrainment by hydraulic dredging operations on aquatic organisms poses severe technical challenges. Studies demonstrate the difficulties in determining precise estimates of absolute entrainment rates and have seldom been able to determine population level consequences with any degree of accuracy or confidence.

For more information see **AHFB study**, Section 7.9.

Benthic Disturbance from Dredging Activity⁹

⁷ See also AHFP Study, Section 8.

⁸ See also AHFP Study, Section 7.7.

⁹ See also AHFP Study, Section 7.9.

Factors affecting benthic recovery after mining activities include:

- Physical and habitat conditions within the mined area;
- Species composition and life history patterns;
- Benthic community diversity and abundance prior to mining;
- Distribution of species within the regional area;
- Percentage of area disturbed; and
- Dispersal, growth rates, and seasonal cycles of species impacted.

Using a conceptual model of succession in ecosystems, the early stages of succession are dominated by opportunistic species with high reproductive rates, small body size, and surface deposit feeding strategies. This type of community is characterized as a “colonization” community, which would move towards an “equilibrium” community if other factors remain the same. Mining activities generally occur in deep water (> 20 feet) areas characterized by relative high current velocities and high energy (e.g., sand waves). Benthic organisms in these areas are typically rapid colonizers of areas frequently disturbed by natural conditions. Benthic recovery in these areas is expected to be short (e.g., 1 month to 1 year) following mining. No long-term regional impacts have been identified.

For more information see **AHFB study**, Section 7.9.

Aquatic Vegetation¹⁰

Aquatic plants occur within the intertidal and shallow subtidal zones of both Central Bay and the Suisun Bay complex. Within Central Bay localized, shallow water subtidal areas have been colonized by eelgrass that serves important habitat and ecological functions within the estuary. Further upstream within the Suisun Bay complex shallow-water channel margins have been vegetated by tules and a variety of other vascular plants. As a consequence of the relatively high turbidity and suspended sediment concentrations naturally occurring within the Bay-Delta estuary light penetration (photic zone) limits the occurrence of aquatic and emergent vegetation to relatively small, shallow-water areas within both Central Bay and further upstream within the estuarine portion of the Suisun Bay complex.

Impacts of sand mining on aquatic plants would be limited to areas where such plants occur, these areas being limited to shallow water channel margins and mud flat areas by light penetration and a number of other factors. Other factors that affect the growth of aquatic plants include erosion by wave action, both natural wave action and waves generated by shipping and recreational boating, and shoreline and benthic erosion associated with tidal and river flows.

Habitat within and surrounding areas of the Central Bay where sand mining occurs are characterized by deep subtidal areas having virtually no rooted and/or emergent aquatic vegetation. Aquatic vegetation, such as eelgrass, is limited to shallow-water areas around the periphery of the Central Bay. Since sand mining activity is limited to water depths from approximately 30 to 90 feet, sand mining activity would not involve excavation of aquatic vegetation. Within Suisun Bay, rooted and emergent aquatic vegetation is limited to narrow areas along channel margins and mudflats where water depth and access preclude sand mining. Therefore, sand mining would not be expected to adversely affect aquatic vegetation.

Furthermore, dissipation of the overflow plume by sediment settling and turbulent dispersion, in addition to the short-duration (a period of hours) when the overflow plume would occur, would

¹⁰ See also AHFP Study, Section 7.3.

not be expected to result in adverse indirect effects on aquatic vegetation as a result of reductions in water clarity and photosynthetic activity. Tidal hydrodynamics within the Central Bay and Suisun Bay contribute to rapid movement of the overflow plume on both flood and ebb tidal cycles, which further reduce the duration that increased turbidity, could occur within an area where aquatic vegetation is present.

For more information see **AHFB study**, Section 7.9.

Introduction or Spread of Invasive Species¹¹

The Bay-Delta estuary has been colonized by a large number of introduced exotic species. Some species introductions, such as striped bass and American shad, have been made through conscious action while a majority of other species introductions have resulted from the inadvertent transport and release of species into the estuary. Many of the inadvertent species introductions have occurred as a result of ballast water discharges, associated with importation of oysters, as part of fouling communities on ship hulls, and through a variety of other mechanisms.

There is no quantitative data available for use in evaluating the relationship between sand mining activity and the distribution and abundance of invasive species, it can be speculated that processes resulting in frequent disturbance of subtidal habitat areas, including both natural processes and sand mining activity in addition to maintenance dredging, could favor localized short-term colonization by invasive benthic macroinvertebrates. Since many of these invasive macroinvertebrate species extensively colonize subtidal habitats within the Bay-Delta estuary, including many areas where disturbance results from natural processes, many of the species serve similar ecological functions as do native species in terms of trophic energy dynamics in addition to serving as prey for many of the fish and macroinvertebrates inhabiting the system.

It has been hypothesized that sand mining would potentially affect the spread of invasive species of fish or macroinvertebrates within the Bay-Delta estuary through two potential mechanisms, which include (1) the transport and introduction of invasive species into the estuary from other water bodies and (2) benthic disturbance or other changes to subtidal habitat that would favor colonization by invasive species when compared to native species of fish and/or macroinvertebrates. The analysis conducted has identified no potential for sand mining to introduce new invasive species to the area and that sand mining would not contribute to the transport or movement of invasive species.

Given the current permit and lease restrictions and the depth restriction mitigation in place, approval and implementation of Reclamation Plans for these operations could have no impact on the spread of invasive species.

For more information see AHFB study, Section 7.9.

Impact Analysis

No significant direct or indirect impacts have been identified as a result of sand mining activity within the Central Bay or Suisun Bay on aquatic vegetation and no evidence indicates that marine sand dredging has had an adverse effect on long-term regional impacts on species

¹¹ See also AHFP Study, Section 7.2.

composition or benthic habitat. However, certain depth restrictions are currently observed that may help avoid impacts of significance.

The RWQCB Order applicable to the following operations in the Suisun Bay requires that each applicant implement depth and setback limitations to ensure shallow water habitat is avoided in the Suisun Bay.

- Hanson Suisun Bay Middle Ground Shoal
- RMC Suisun Bay Middle Ground Shoal
- Jerico Suisun Bay Middle Ground Shoal

In order to approve the reclamation plan the following setback restrictions in the current RWQCB Order shall be followed.

- Marine sand dredging is prohibited within 200 feet of any shoreline and within 250 feet of any water less than four feet in depth (MLLW).

To extend the acceptance of Reclamation Plans past the expiration of the current Order (see **Table 1**) the Order must be reissued and the same, or parallel restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Order prior to the expiration of the current Order and present it to the SMGB for acceptance.

The USACOE Permit and/or the BCDC permit permits applicable to the following operations in the Central Bay require that each applicant implement depth and setback limitations to ensure shallow water habitat is avoided in the Central Bay. In order to approve the reclamation plan or to extend the approval of the following Reclamation Plans past the expiration of the current permit, these setback restrictions must be followed.

- Hanson Point Knox Shoal; 30-foot MLLW water depths.
- Hanson Alcatraz, Presidio, Point Knox: 200 feet away from any shoreline and 250 feet from 4-foot MLLW shoals **or** 100 feet f Alcatraz Island and 30 foot MLLW.
- Hanson Point Knox South: 30-foot MLLW water depths.
- Hanson Alcatraz South Shoal: 30-foot MLLW water depths.

To extend the validity of the approved limited term reclamation plan past the expiration of the current Permits, the Permits must be reissued with the same, or parallel restrictions. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

V. CULTURAL RESOURCES

Environmental Setting

There is extremely low potential for historical, archaeological or significant or unique paleontological resources to be located on the floor of the Bay-Delta or in the waters of the estuary.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to 15064.5? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Disturb any human remains, including those interred outside of formal cemeteries? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Any disturbance from marine sand mining will tend to impact either the floor of the Bay-Delta estuary or the waters within the estuary without any impact to historical resources due to the extremely low potential for historical, archaeological or paleontological resources to be located there.

Impact Analysis

Reclamation plan approval and implementation will result in no significant impact on historical or archeological resources.

VI. GEOLOGY AND SOILS

Environmental Setting:

The majority of the bay bottom sediment is fine-grained material (in geologic nomenclature for particle size, the sediment would include silt, clay, and fine sand). However, locally within Central Bay and Suisun Bay channels, sediment deposits suitable for construction purposes exist -- medium to coarse grained sand and, in some places, gravel.

The dynamics of sediment, and particularly sand, within the Bay-Delta estuary are complex. Sand deposits within the estuary may have been derived from bedload transported from the Sacramento and San Joaquin river watersheds, local erosion and the contribution of tributaries and stormwater flows, and from coastal marine sources, which are influenced by coastal and tidal currents moving into and out of San Francisco Bay through the Golden Gate. Information on bedload transport, the contribution of sand transported into San Francisco Bay from coastal areas by longshore currents and tidal action, and factors contributing to localized and regional sediment accretion and depletion within Central Bay and Suisun Bay improve the overall understanding of the sediment budget and processes affecting sediment within the estuary.

Sand deposits on the floor of the Bay-Delta estuary are restricted to two general areas; a western zone that includes the sand mining leases in Central Bay, and an eastern zone that includes the sand mining leases in Suisun Bay. Within Central Bay, there is a contrast in sand characteristics between the Pt. Knox Shoal / Alcatraz Shoal areas and Presidio Shoal. The Pt. Knox Shoal / Alcatraz Shoal area has appreciable coarse sand and gravel. Presidio Shoal samples were much finer grained, similar to the Colma Formation and modern beach sands. The sand sample collected from Central San Francisco Bay (Point Knox Shoal / Alcatraz Shoal area) had clasts that were angular to round. The notable content of material derived from the Franciscan formation, particularly chert, is similar to the descriptions of Gilbert (1917) for sand samples from the San Francisco Bar (which Gilbert also called the Golden Gate bar), offshore of the Golden Gate. The sand of the Suisun Bay sample had clasts that were sub-angular to subrounded, indicating a more uniform history of abrasion than Central Bay sand. The sand in Central Bay has abundant grains and pebbles of Franciscan chert (as well as other Franciscan rock types -- a sedimentological study of their relative abundances in the mined sand has not been performed), while the Suisun Bay sand has none. This suggests that Central Bay sand is at least partially derived from rocks west of the Hayward fault, rather than having been transported down the river system from the Suisun Bay area. Gilbert (1917) noted the presence of Franciscan chert in sand samples from the San Francisco Bar, and concluded that the potential contribution of sand from the rivers "is of no practical importance", a conclusion that may well apply to Central Bay sand as well.

Most of the fine grained sediment in the Bay-Delta estuary (called Bay Mud) has been deposited in the period of rising sea level since the low sea level stand of the Last Glacial Maximum (approximately 10,000 years before the present), resulting in the shallow bay we now know. In the area offshore of the Golden Gate, the complex faults of the San Andreas Fault zone are masked by recent, unconsolidated sediment of the San Francisco Bar. The sediment that is dredged from the Bar for navigation access is predominantly medium sand with some coarse sand. Quantification of sand flow eastward through Golden Gate and into Central Bay, corresponding to the westward transport that maintains the Bar, is not straightforward, but, conceptually, the existence of such transport appears reasonable and is documented in the literature.

Sand is being eroded from the Merced Formation and Colma Formation directly onto the coast, forming white beaches of fine, mostly quartz sand. On Angel Island, the beaches derived from the Colma Formation are bathymetrically continuous with the Pt. Knox Shoal sand mining areas, so this appears to be a geologically active modern source of sand to this mining area of the bay. Geologically, this is an active sediment source, but volumetrically it is small. The potential

contribution of sediment source areas outside the Golden Gate to Central Bay sand mining resources includes longshore transport. The fine grain size of the material at Presidio Shoal appears to be consistent with a dominant component of longshore current transported sand, with material properties similar to the sand at Ocean Beach. Similarly, the debits would include offshore transport, solution and abrasion, and sand mining. Within the San Francisco Littoral Cell they show southward sand transport on the San Francisco Bar, both eastward and westward sand transport through the Golden Gate, and both northward and southward sand transport at Ocean Beach (south of the mouth of Golden Gate).

Changes to Central Bay sediment regime due to diminution of the San Francisco Bay tidal prism (tidal flow volume and velocity) may have occurred, similar to those described by Gilbert (1917) for the San Francisco Bar.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: | | | | <input checked="" type="checkbox"/> |
| i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| ii) Strong seismic ground shaking? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| iii) Seismic-related ground failure, including liquefaction? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| iv) Landslides? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Result in substantial soil erosion or the loss of topsoil? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| liquefaction or collapse? | | | | |
| d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion:

Results based on the bathymetric surveys of each lease location as well as site-specific analysis demonstrate the dynamic nature of sediment movement and patterns of accretions or depletions within the Central Bay and western Delta. Results of these analyses provide no evidence of any discernable or consistent pattern in sediment accretions or depletions occurring within those lease areas of Central Bay or the western Delta or in the more specific lease areas where sand mining activity is occurring when compared to sediment dynamics elsewhere within Central Bay (**AHFP study**, Section 4.0, 6.0).

Sediment Transport¹²

Freshwater flow from the Sacramento and San Joaquin river systems and tidal exchange through the Golden Gate are significant hydrologic processes affecting suspended and bedload transport of sediments, and patterns of sediment accretions and depletions within various portions of the estuary. Sand and other sediments are transported from the upstream Sacramento and San Joaquin river watersheds into Suisun Bay, with the greatest transport occurring during periods of high river flow in combination with strong ebb tide conditions.

Patterns of sediment transport and areas of accretions and depletions within Central Bay are more complex than within Suisun Bay with a strong influence of tidal current velocities and tidal sediment exchange through the Golden Gate. The source of sand and other sediments within Central Bay is thought to originate from both river transport from Suisun Bay and San Pablo Bay and from nearshore coastal areas associated with the San Francisco Bay Bar, and to a smaller extent from local erosion and tributary inflow.

Sand deposits within areas of Suisun Bay appear to be strongly correlated with water velocities. Areas of sand deposition occur primarily within deeper navigational channels within the Suisun Bay area, having relatively high water velocities, resulting in bedload transport, deposition of sand and erosion and scour of fine sediments including silt and clay. Sand deposits within Central Bay also appear to be strongly correlated with tidal velocities. Areas of deposition

¹² See also AHFP Study, Executive Summary.

within Central Bay correspond with tidal velocity predictions which are consistent with dynamic bedload movement (e.g., sand waves) within areas where sand is deposited. These dynamic bed forms within Central Bay are characterized by the occurrence of sand waves and are consistent with observations of low percentage of fine material within the sand deposits, resulting from erosion and scour of fine sediments associated with higher velocity areas.

Figure 3: Flood Tide Current: Central Bay

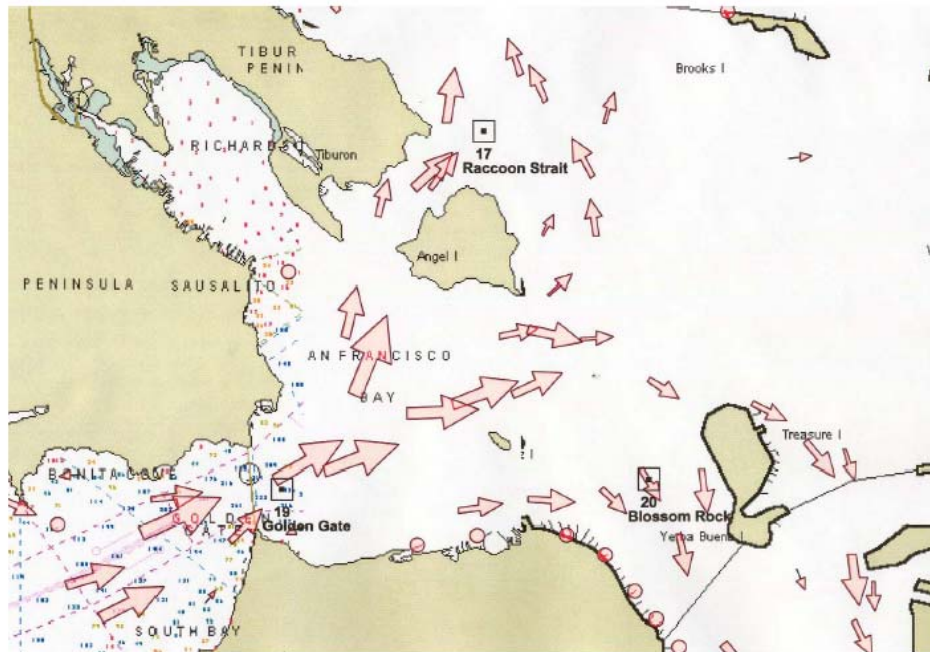


Figure 4-12a. Flood tide current: Central Bay.

Figure 4: Ebb Tide Current: Central Bay

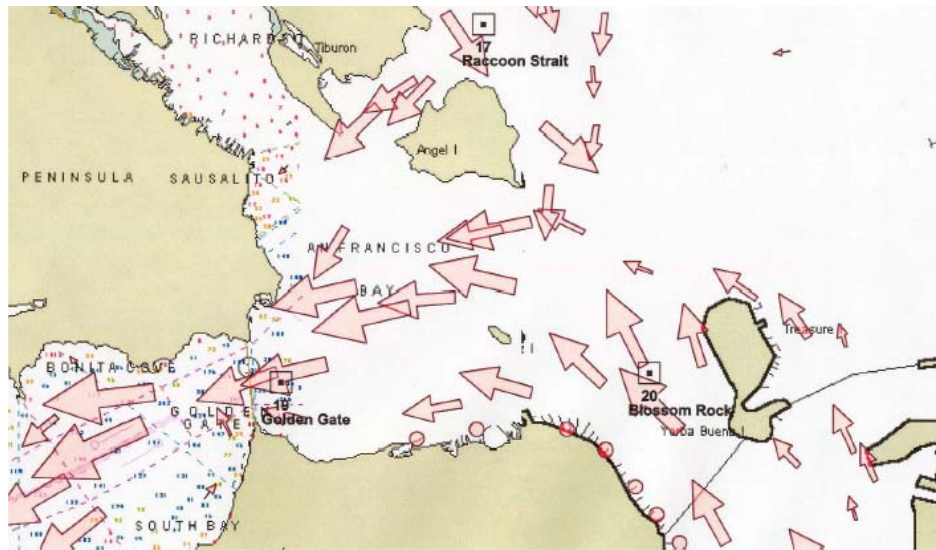


Figure 4-12b. Ebb tide current: Central Bay.

12-01-03 Section 4 Figures and Tables

72

Figure 5: The “Sand Wave” Effect within Central Bay (Source USGS):

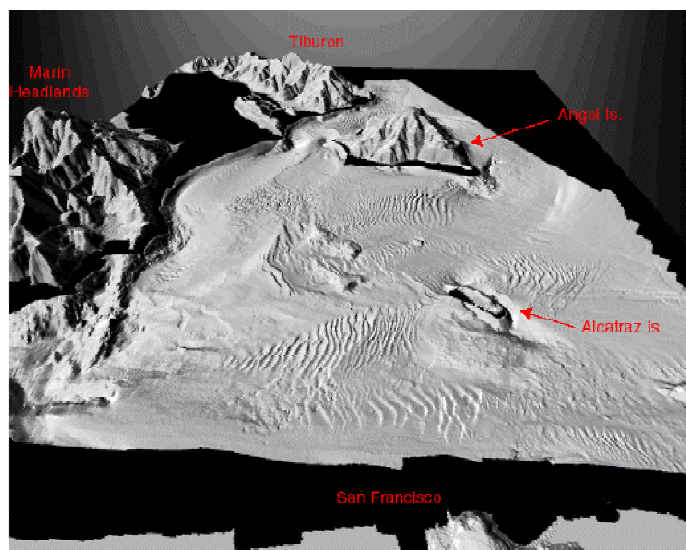


Figure 4-17a. Multibeam backscatter image of Central San Francisco Bay.

Bay Bathymetry¹³

Analyses of bathymetric survey data collected semiannually within Central Bay are characterized by dynamic patterns of accretions and depletions. As part of the **AHFP study**, information was compiled from each of the bathymetric surveys of each lease location to characterize patterns and trends of accretions and depletions on a regional basis in addition to more refined analyses within specific locations where sand mining activity is known to occur.¹⁴

Sediment accretions and depletions within Central Bay lease areas as well as the Western Delta lease areas are characterized by substantial variability over the period from January 1999 through July 2002. Overall, there appears to be a general pattern of substrate accretion in January 1999, January 2000 and January 2001 through January 2002 collectively for all lease areas surveyed within the Central Bay and January 2000 through July 2001 within the Western Delta.

Results of the specific surveys conducted within lease areas in the Central Bay: PRC 709 East, 709 North, 709 South, 2036, 5871, 7779 East, 7779 North, 7779 West, 7780 North and 7780 South, between January 1999 and July 2002 showed an overall net depletion of sediment within all lease area with the exception of 709 North, 709 South, and 7779 North. Results of the bathymetric surveys showed a net depletion in sediment within lease area 709 East of -2.5 million cy, 2036 of -4.8 million cy, 5871 of -4.4 million cy, 7779 East of -6.5 million cy, 7779 West of -1 million cy, and 7780 South of -1.9 million cy. In lease areas 709 North, 709 South and 7779 North there was a net accretions of 2.9, .9 and 1 million cy over the January 1999 through July 2002 period, respectively. Overall, in the Central Bay, there was a net depletion of approximately 2.6 million cy of sediments from January 1999 through July 2002.

Results of the specific surveys conducted within lease areas in the Western Delta: Carquinez Strait lease 5733, and Suisun Bay leases Carquinez West and East between January 1999 and July 2002 showed an overall net accretion of sediments within in Suisun Bay and a net depletion in Carquinez Strait. Results of the bathymetric surveys showed a net accretion in sediments within in Carquinez West of 17 thousand cy, and Carquinez East of 7.3 million cy. In lease area 5733, there was a net depletion of 54 thousand cy. Overall in the Western Delta, there was a net accretion of 7.3 million cy of sediments from January 2000 through January 2003.

Data compiled by Ogden Beeman and Associates on differences in bathymetric profiles over the period from 1955 through 1990 provide further information demonstrating the complexity and dynamic nature of sediment accretions and depletions within the Central Bay up stream through the western Delta. Results of the surveys likewise show high variability in accretions and deletions within the Central Bay and western Delta including regions where sand mining occurs and in areas where sand mining activity does not occur.

Results of these more detailed analyses suggest that patterns of accretions and depletions are highly variable both spatially and temporally; this variability should be taken into consideration when evaluating regional and site-specific information on sediment accretions and depletions. Analysis done as part of the Ogden Beeman study showed that in general accretion and depletion of sediments varies from as much as -6 feet to 4 feet in parts of the Central Bay and western Delta.

¹³ See also AHFP Study, pp. 4-29, 4-30.

¹⁴ See also AHFP Study, pp. ES-4, 1-6.

As part of the bathymetric surveys, relying on accretion depletion data, the changes in depth for each lease location surveyed were calculated as a change from January 1999 through January 2002. In the Central Bay results show high variability in the change of depth from –18 feet at lease location 7779 East to 4 feet at lease location 709 North. In the Western Delta, from January 2000 through January 2003, changes in depth in the Carquinez Strait is calculated at approximately –6 feet, while in the Suisun Bay, combining Carquinez East and Carquinez West lease areas, a net increase in depth of 5 feet is shown.

Due to the results of the surveys which show high variability in accretions and depletions within the Central Bay and Western Delta including regions where sand mining occurs and in areas where sand mining activity does not occur, the bathymetric survey data were subdivided into smaller site-specific geographic areas representing locations where sand mining activity has been observed to be concentrated (20 or more sand mining events recorded from the operation logs within an area) and in adjacent areas where sand mining activity has been low or absent (six or less sand mining events recorded within an area) during the long-term study. Bathymetry data for each site-specific area over the period from January 2002 through January 2003 were analyzed to determine patterns in accretions and depletions and changes in water depth in Central Bay. Results of these analyses showed, that for those locations having 20 or more mining events, sediment depletion (increases in water depth) was observed within five sites while sediment accretion (reductions in water depth) was observed in five sites included in these analyses. Results of bathymetric surveys for site-specific areas having six or less sand mining events showed sediment depletion within six areas and sediment accretion within seven areas.

Shallow Subtidal Areas, Freshwater Flows and Deep Water Subtidal Areas¹⁵

Results of analyses conducted in the **AHFP study** have not shown a significant pattern of changes in depth contours for shallow-water habitat along the channel margins within either Suisun Bay or Central Bay. In addition, much of the sediment expected to be deposited within these shallow water habitat area sites is characterized by fine grained material (e.g., silt, clay, mud) with a relatively low percentage of sand. Sand mining within deep water areas is not expected to result in substantial changes in deposition or erosion of fine-grained sediments along the margins of shallow water habitat areas. In the Central Bay, changes in area of contour depths do not occur close to sand mining locations. The changes in area of depth contours, for both increase and decrease of area, are in regions subject to low velocities and characterized by fine sediments where sand mining does not occur. These areas are prone to erosion and deposition depending on wind/wave action. Dredging of navigation channels could account for large changes of depth contour areas at certain depths (e.g. 18 ft) and this type of maintenance dredging along with natural sediment dynamics represents the change in each depth contour area for Central Bay.

In Suisun Bay, sand mining occurs only within the navigation channel running through the bay. The main concern for habitat change within Suisun Bay is the possible indirect alteration of sediment dynamics along channel margins leading to altered shallow water habitat area. Analyses conducted to date do not show a significant pattern of changes in depth contours for shallow-water habitat along the channel margins within Suisun Bay. In addition, as above, much of the sediment expected to be deposited within these channel margin shallow water areas are characterized by fine grained material (e.g., silt, clay, mud) with a relatively low percentage of sand. Sand mining within the main channel is not expected to result in

¹⁵ See also AHFP Study, Section 7.10.

substantial changes in deposition or erosion of fine-grained sediments along the channel margins within existing or shallow water habitat areas.

Impact Analysis

Only high velocity current areas in the Bay-Delta shall be dredged, in accordance with current Permits and Orders, which require no mining in shoal and near shore locations. This will continue to provide that an influx of replacement sediment is carried-in by high velocity currents that would eradicate and fill any excavated voids left by dredging activity. Current and subsequent permits will continue to require depth limitations on the dredging locations. The Permits and Order require the following:

- In the Suisun Bay, the SWRCB Order, which is renewed on an annual basis, will continue to prohibit dredging within 200 feet of any shoreline and within 250 feet of any water less than four feet in depth (MLLW) to ensure shallow water habitat is avoided.
- In the Central Bay, BCDC and the USACOE both will continue to require setbacks from shoals and islands (**Table 1**) for all operations.
- The RMC Alcatraz Sand Shoal USACOE Permit has expired and BCDC's Permit does not currently limit dredging depths for the operator, but expires in January of 2005. Renewal of the permit must incorporate similar depth restrictions.
- In the Carquinez Straits, the RMC USACOE Permit has expired and BCDC's Permit does not currently limit dredging depths for the operator and expires in January of 2005.
- To extend the validity of the approved limited term reclamation plan past the expiration of the current Permits, or where current Permits have already expired, the Permits must be reissued with the same, or parallel restrictions. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

The technical challenges of accurately assessing changes in bathymetry have been a subject of some debate. The dredging activities are situated in the most dynamic locations in the Bay-Delta, where commercial sand is present. Fine changes in elevations due to sand dredging tend to be masked by larger natural substrate elevation and distribution fluctuations under tidal influence, cumulative sediment availability and transport, shipping channel maintenance dredging, and potentially, the manifestation of global climatic change. Improvement of the precision, accuracy and potential usefulness of the bathymetric data collected is to be addressed using adaptive management of permit and lease monitoring requirements.

Most permits for both the BCDC and USACOE require an annual (or more frequent) report including replenishment monitoring as discussed in the AHFB Study. The USACOE permits also describe a condition requiring the evaluation of impacts that may result from any detected lack of replenishment (See **Table 1**). The AHFB Study includes a discussion of additional approaches that would facilitate the collection of meaningful bathymetric data for monitoring the marine sand dredging operations (**AHFB study**, Sections 9.1, 9.2, and 9.3). These approaches

are currently being considered by a working group of agency and industry representatives for adoption as future lease and permit requirements.

Reclamation plan approval will not have a significant adverse effect on sediment transport or area bathymetry. Replenishment studies are currently stipulated under the lease agreements for all SLC leases in the Central Bay, Carquinez Strait and Suisun Bay. All non-SLC leases in the private holdings in Suisun Bay require replenishment monitoring by the BCDC and USACOE (**Table 1**). However, the BCDC permits which require this expire in September 2006 (RMC Suisun Middle Ground Shoal and Jerico Suisun Middle Ground Shoal) and USACOE will expire in November of 2007 (Hanson Middle Ground Shoal).

Dredging sand from the Bay-Delta substrate does not involve building UBC-restricted structures or any other structures. No wastewater facilities will be provided and no soils will be affected. No landslides, subsidence, or liquefaction or soils collapse could be expected from the minor changes of the relatively flat topography where the dredges operate.

Existing infrastructure such as pier footings, bridge foundations and buried cable and pipelines could be negatively affected by over-excavation of the substrate or increased scour if dredging activities were of a magnitude and located within a sphere of influence of these facilities. However, dredging lease areas do not presently occur in areas where these facilities are located and current monitoring surveys do not detect persistent changes in bathymetry.

- Accelerated loss of substrate through mining and lack of replenishment of substrate during the reclamation process would be the main concern in terms of the projects' impacts on the geologic environment. Leases and permits all have not-to-exceed annual production volumes. Geologic impacts shall be avoided, in part, by allowing that no substantial increase in the volumes (defined as a 5% increase of the total in any single lease) without further analyses.

To extend the acceptance of Reclamation Plans past the expiration of the current Permits and Orders (see **Table 1**) the Permits and Orders must be reissued and the same, or parallel restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Permits and Orders prior to the expiration of the current Permit and Order and present them to the SMGB for acceptance.

VII. HAZARDS AND HAZARDOUS MATERIALS

Environmental Setting

No discharge of hazardous waste will result from the approval and implementation of the Reclamation Plans.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| Would the project: | | | | |
| a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| h) Expose people or structures to a significant risk of loss, injury or death | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|--------------|
| involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands? | | | | |

Discussion

The approval of the Reclamation Plans for the sand dredge operations will not impact an airstrip or area of potential wildland fire. No hazardous wastes are involved in the dredging operations, nor would be generated by approving or implementing the Reclamation Plans.

Impact Analysis

No significant impact will occur. No mitigation for fire suppression, hazardous wastes, or impacts to an airport is required.

VIII. HYDROLOGY AND WATER QUALITY

Environmental Setting:

Information on water quality conditions within the estuary is available from a variety of sources. Analysis of information on sediment characteristics has shown a consistent pattern of reduced chemical constituent concentrations within those sediments having a low percentage of fines, such as the sediment deposits where sand mining occurs. Increased concentrations of various constituents have been observed, in general, as the percentage of fine sediments increases within an area. Results of these analyses are consistent with the hypothesis that sand mining within those areas of the estuary characterized by coarse sand substrate with a low percentage of fines would not be expected to result in a substantial risk of resuspension of chemical contaminants that may adversely affect fish and other aquatic organisms.

Measurements of dissolved oxygen within the estuary have shown that water quality conditions are suitable for fish and macroinvertebrates throughout Suisun Bay and Central Bay.

The balance between freshwater inflow to the estuary from the Sacramento and San Joaquin river systems and other tributaries, and tidal exchange of marine waters at the Golden Gate, strongly affect salinity gradients within the estuary. The estuary is characterized by freshwater or low salinity and conditions within Suisun Bay with salinity increasing further downstream with more marine conditions occurring within Central Bay. The salinity gradient within the estuary is the driving force for gravitational circulation, and is an important factor influencing both sediment dynamics, contributing to flocculation of suspended sediment particles and areas of sediment deposition, and has also been shown to be a significant factor affecting species composition and the geographic distribution of fish and macroinvertebrates within various regions of the estuary, and hence their vulnerability to potential effects resulting from sand mining operations.

The freshwater inflow to Suisun Bay and the tidal exchange of marine waters through the Golden Gate are also important factors affecting ambient turbidity and suspended sediment concentrations within various regions of the estuary. Results of suspended sediment monitoring

by USGS at various locations within the estuary have shown a pattern of both substantial seasonal and geographic variability in suspended sediment concentrations. Suspended sediment concentrations are typically greatest during high flow periods within the estuary, normally occurring during late winter and early spring periods of precipitation, stormwater runoff, and increased flows within the Sacramento and San Joaquin river systems.

Increased concentrations of suspended sediments are also associated with wind and wave-induced turbulence, resulting in resuspension of relatively fine grained materials from the shallow-water areas along the margins of the estuary. Within Central Bay, turbidity and suspended sediment concentrations have been observed to vary in response to tidal conditions with relatively low suspended sediments occurring during periods of flood tide when relatively clear, coastal marine waters move into Central Bay and increased suspended sediment concentrations on ebb tides as waters from Suisun and San Pablo bays move downstream into Central Bay area. Variation in suspended sediment concentrations within Central Bay has also been observed in response to tidal current patterns, resulting in upwelling within various areas of Central Bay.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) Violate any water quality standards or waste discharge requirements? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| would result in flooding on- or off-site? | | | | |
| e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Otherwise substantially degrade water quality? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g) Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| h) Place within a 100-year flood hazard area structures, which would impede or redirect flood flows? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| j) Inundation by seiche, tsunami, or mudflow? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Potential Effects of Sand Mining on Suspended Sediments¹⁶

Results of analyses performed to date have not detected potential adverse impacts associated with increased suspended sediments within the overflow plume for tolerant species such as Dungeness crab, bay shrimp, California halibut, English sole, gobies, sculpin, midshipmen, or incubating Pacific herring eggs. The results of these analyses have shown, however, that there is a potential for short-term localized changes in the geographic distribution for sensitive fish species, such as northern anchovy and juvenile and adult Pacific herring, as a result of behavioral avoidance of the overflow plume. These changes in species distribution would be limited to the immediate vicinity of the overflow plume if suspended sediment concentrations exceed thresholds for behavioral response. At the completion of a mining event, and dissipation of the overflow plume, these sensitive fish species would be expected to redistribute themselves within the mining area. These temporary, localized changes in distribution of sensitive species have not been identified as a significant adverse impact of mining, and would not be expected to alter prey capture for predatory species such as California halibut, to an

¹⁶ See also AHFP Study, Section 7.8.

extent that would degrade the health or condition of either the predator or prey species inhabiting the area.

Potential Effects of Sand Mining due to Contaminants within the Overflow Plume¹⁷

No evidence suggests that sand mining activity would result in an increased exposure and risk of adverse impacts to fish and macroinvertebrates as a result of contaminant re-suspension during sand mining activity. Furthermore, the sand mining overflow plume does not represent an increased risk of toxicity. No evidence was found that levels of pollutants within the overflow plume are significantly different from ambient background conditions.

Contaminants have been found to be primarily bound to fine silt and clay particles, and have not been found to be absorbed or adsorbed to sand particles. Since sand mining within Central Bay and Suisun Bay is conducted in areas characterized by relatively high water velocity and dynamic substrate movement, the sand deposits characteristically have a very low percentage of silts and clays. Results of grab samples and sediment analyses have consistently shown that within the areas where sand mining occurs, the percentage fines have consistently been less than 10%. Furthermore, the likelihood of contamination of the fine-grained sediments that do occur in these deeper offshore areas where sand mining occurs is lower than the industrial and commercial areas near shore where maintenance dredging occurs, and from which dredge materials must be disposed.

Toxicity studies previously required by the Regional Water Quality Control Board (MEC 1993) conclude that no adverse chemical effects would occur within the water column from the return of sand particles to Central and/or Suisun bays from the overflow plume during sand mining operations. The RWQCB, through issuing a general Waste Discharge Requirement permit, has determined that the overflow plume from sand mining does not cause waters of the State to exceed the following quality limits downstream of the zone of discharge:

- Dissolved Oxygen: 5.0 mg/l minimum;
- Dissolved Sulfide: 0.1 mg/l maximum; and
- Toxic or other deleterious substances: None are present in concentrations or quantities that could cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

Potential Effects of Sand Mining on Dissolved Oxygen Concentrations¹⁸

No evidence suggests that sand mining activity within the Bay-Delta estuary would result in depressed dissolved oxygen concentrations within the plume or contribute to adverse impacts to fish and macroinvertebrates inhabiting the area. There is no obvious mechanism by which sand mining would result in significantly lower dissolved oxygen levels. In clean sand, BOD in the discharge from the barge would be low, and the process of discharging fine grained sediments into the water column results in turbulent mixing, introducing oxygen into the water. All leases are subject to the requirements of the RWQCB Permit or waiver for WDR's, independent of all other permitting and leasing requirements. SMARA requires that a reclamation plan minimize substantial impacts to water quality in accordance to RWQCB specifications.

¹⁷ See also AHFP Study, Section 7.6.

¹⁸ See also AHFP Study, Section 7.5.

RWQCB Requirements

The Water Quality Control Plan for the San Francisco Bay Region prohibits discharge of waste water which has particular characteristics of concern to beneficial uses at any point in San Francisco Bay and at any point where the waste water does not receive a minimum initial dilution of at least 10:1 or into any non-tidal water, dead end slough, similar confined water, or any immediate tributary thereof. The discharge of the effluent plume from the sand dredges is regulated under the Porter-Cologne Water Quality Control Act and must discharge where a dilution ratio of 10:1 will be achieved.

The RWQCB has recognized that sand mining results in a discharge plume of turbid water ("return-flow", "decant water" or "overflow") to waters of the Bay-Delta. Sand dredging activities occur in high velocity current areas where commercial sand is located and dilution ratios are high. The RWQCB has recognized in its San Francisco Bay Region Basin Plan that a 10:1 dilution ratio is generally met or is exceeded during the course of sand dredging activities and, if the dilution ratio continues to be met or exceeded, would satisfy water quality criteria of the Basin Plan. Therefore, RWQCB Order #95-177 and its amendments require this criteria to be upheld, and requires a self-monitoring program be in place to insure continued observation of the criteria.

Plume Duration Significance

Although sand mining activity may occur at any time of the day, the operation itself, i.e., mining the sand and loading the barge, typically lasts between 2.5 and 5.5 hours. Once the barge is loaded, it travels to an upland offloading location. Depending on the mining and offloading locations, the entire operation – including loading, unloading and travel time – can take anywhere from 8 to 24 hours. Under these circumstances, from an operational perspective, the greatest frequency that any given area would be disturbed by a single mining vessel is twice in any 24-hour period. Tidal conditions may further reduce the frequency of sand mining operations and disturbance of the sand shoals (for example, the onset of low tide at the time a barge is available to return to the sand shoal could delay the sand mining activity). The relatively short duration of sand mining events serves to reduce the duration of potential exposure of aquatic organisms to the overflow plume and the potential for adverse impacts to aquatic organisms.

Impact Analysis

No impact to flooding, flood zones, or to sieche or tsunامي result from the adoption or implementation of the Reclamation Plans for the commercial sand dredging activities.

- RWQCB Order #95-177 and its amendments shall be followed and a self-monitoring program shall be in place to insure continued observation of the 10:1 plume dissipation requirement criteria. This will ensure that deleterious constituent concentrations are kept to an acceptable level.

To extend the validity of the approved limited term reclamation plan past the expiration of the current Order, the Order must be reissued with the same, or parallel restrictions. The operator must secure a valid extension of the Order prior to the expiration of the current Order and present it to the SMGB for acceptance.

IX. LAND USE AND PLANNING

Environmental Setting

Bay-Delta development is subject to planning under the authority of the BCDC, established by the McAteer-Petris Act of 1965. The vision for Bay-Delta development is formulated in the subsequent San Francisco Bay Plan of 1969.

Water Quality planning for the Bay-Delta is subject to the SWRCB Water Quality Control Plan for the San Francisco Bay – Sacramento San Joaquin Delta Estuary of 1995. The Plans each outline and provide some detail for management of the San Francisco Bay and Bay-Delta, and the subsequent issuance of permits.

The USACOE issues permits based on National Wetlands Policies. These policies set out guidelines for permitting marine sand mining activities in accordance with rule-based limits and mitigation in place nationwide.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| - Would the project: | | | | |
| a) Physically divide an established community? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Conflict with any applicable habitat conservation plan or natural community conservation plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

No mining, and therefore no reclamation, activities can occur without approval of the responsible agencies for Bay-Delta planning (BCDC), water quality protection (RWQCB) and wetlands policy (USACOE). All activities are subject to permits from these agencies, and are monitored by the agencies to adhere with land use plans administered by these agencies.

Impact Analysis

No impact to land use planning is anticipated with the adoption and implementation of the Reclamation Plans.

X. MINERAL RESOURCES

Environmental Setting

At this time, construction aggregate is in short supply in the San Francisco Bay Area. The term "aggregate" includes a combination of sand (about 40%) and gravel or crushed stone (about 60%). The sand and gravel can be mined from river beds, river terraces, in bays such as the San Francisco Bay and the Suisun Bay and rock quarries. Historically, sand has been the product in short supply in those mining applications and gravel was in abundance. In 2002, Hanson depleted the land-based reserves that were supplying about four to five million tons per year of construction aggregate into the San Francisco Bay Area market. Both the Hanson Radum facility near Pleasanton and the Windsor facility near Santa Rosa are no longer in operation. The Hanson Felton sand operation in Santa Cruz County will be out of reserves in 2004. RMC shut down its Santa Cruz County sand operations in 2002. Sand is the aggregate that remains is in short supply relative to gravel.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

According to the California Geologic Survey, sand mined from San Francisco Bay is considered a construction aggregate that is essential to the needs of society, providing material for the construction and maintenance of roadways, dams, canals, buildings and other parts of the infrastructure of our State. Construction aggregate can also be found in our homes, schools, hospitals and shopping centers. In 2000 and 2001, California consumed from 230 to 240 million tons of construction aggregate annually, or about 7 tons per person for every man, woman, and child in the State. About 43% of construction aggregate is used in public works projects nationwide, and is paid for with tax dollars. The remaining 57% is purchased by private parties and used for residential and commercial building, private roads and other private facilities. Because the cost of transporting construction aggregate is a significant part of the total cost to the consumer, aggregate mines generally are close to communities that consume the aggregate.

The term "aggregate" includes a combination of sand (about 40%) and gravel or crushed stone (about 60%). The sand and gravel can be mined from river beds, river terraces, in bays such as the San Francisco Bay and the Suisun Bay and rock quarries. Sand is in short supply in the

San Francisco Bay Area whereas the gravel component of aggregate is relatively abundant. Marine sand mining represents a vital resource for meeting current and future aggregate demand within the Bay Area. At this time, both crushed stone and sand are being imported from British Columbia, Canada to meet the local demand for construction aggregate.

The California Geological Survey, *Aggregate Availability in California*, published in 2002, provides the following information about the permitted supply of construction aggregates in relation to demand:

| Region / County | 50-Year Demand (million tons) | Permitted Aggregate Land Based Resources (million tons) | % of Permitted Aggregates compared to Demand |
|-------------------------|----------------------------------|--|---|
| North San Francisco Bay | 648 | 178 | 27% |
| South San Francisco Bay | 1,213 | 564 | 46% |
| Stockton – Lodi | 337 | 260 | 77% |
| Sacramento – Fairfield | 225 | 130 | 58% |
| Totals | 2,423 | 1,132 | 47% |

Note: This table is derived from Table 1 of *Aggregate Availability in California*, California Department of Conservation, California Geological Survey, 2002. The report compares 50 years of aggregate demand relative to permitted aggregate resources as of January 1, 2001. The table was modified to address the Greater San Francisco Bay Area, and demonstrates a deficit of sand reserves in the Bay Area.

The project, which would approve Reclamation Plans for a limited time period for existing marine sand mining operations in the Bay-Delta, would neither increase nor decrease the available supply of commercial building sand in the area, nor in the region. No impact from the approval of the Reclamation Plans is anticipated.

Impact Analysis

No mitigation is required for impacts to mineral resources with the approval and implementation of the Reclamation Plans.

XI. NOISE

Environmental Setting

Sand mining sound pressure levels of 130-140 dB at frequencies of 300-400 Hz at depth will be created by the operation of the dredging equipment.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|-------------------------------------|-------------------------------------|
| Would the project result in: | | | | |
| a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

From the data described in the **AHFP study**, it can be concluded that fish at various life stages, fish eggs and macroinvertebrates exposed to sand mining sound pressure levels of 130-140 dB at frequencies of 300-400 Hz in depths of sand mining operational parameters will not suffer lethal or sub-lethal effects. The levels of sound generated from the sand mining operations are typically around the threshold of fish awareness. It is probable that fish will behaviorally avoid sound pressure levels from sand mining if within the species hearing capacity (Appendix ? Section 7.8). The **AHFP study** concludes that the effects of operational noise be given a “moderately low priority” in any additional studies to resolve dredging impacts (Section 9.8).

The project, which would approve Reclamation Plans for a limited time period for existing marine sand mining operations in the Bay-Delta, would not affect this conclusion.

SMARA Section 2757 prohibits the application of reclamation practices to nuisance noise disturbances. However, the approval of the reclamation plan will not impact local noise disturbances, if any, that could result from the operation of the dredge equipment.

Impact Analysis

No mitigation is required to avoid impacts from noise factors.

XII. POPULATION AND HOUSING

Environmental Setting

The urban infrastructure, population and housing will not be affected by the approval of the marine sand mining reclamation plan approvals.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| -- Would the project: | | | | |
| a) (for example, through extension of roads or other infrastructure)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Displace substantial numbers of existing housing, necessitating the? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

The project would approve Reclamation Plans, for a limited time period, for existing marine sand mining operations in the Bay-Delta. Project approval would not result in any change to the provision of or need for construction of replacement housing elsewhere, nor would it induce substantial population growth in an area, either directly or indirectly.

Impact Analysis

No mitigation for impacts to housing or population is required.

XIII. PUBLIC SERVICES

Environmental Setting

There are no significant fire, police, school or park issues associated with bay sand dredging operations or Reclamation Plans.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: | | | | |
| Fire protection? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Police protection? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Schools? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Parks? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Other public facilities? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

The project would approve Reclamation Plans, for a limited time period, for existing marine sand mining operations in the Bay-Delta. Project approval would not result in any change to the provision of, or need for, public services (including police and fire protection; solid waste and wastewater) and utilities (including water supply, power and communications service). In other words, no significant impact on public services and utilities will result from reclamation plan approval.

Impact Analysis

No mitigation is required to avoid impacts to public services.

XIV. RECREATION

Environmental Setting

Recreational fishing within the Bay-Delta estuary includes fishermen trolling or mooching from vessels primarily within the Central Bay. Recreational boating activities also occur in the Bay-

Delta. Shoreline recreational activities also occur, but would not be impacted by the bay sand dredging operations or implementation of the Reclamation Plans.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Direct and indirect effects of sand mining on recreational and commercial fisheries within the Bay-Delta estuary include potential obstructions to navigation by fishermen trolling or mooching within Central Bay, and temporary localized increases in suspended sediment concentrations that could reduce feeding activity by predatory fish and/or contribute to localized areas where sensitive baitfish, such as northern anchovy, behaviorally avoid during periods of elevated suspended sediment concentrations. The **AHFP study** has found no quantitative information on the relationship between either suspended sediment concentrations or turbidity and recreational or commercial angler success within the Bay-Delta estuary. The available information and observations is limited to anecdotal reports. The potential affects of sand mining on recreational and commercial fishing success are expected to be minimal within the Suisun Bay complex as a consequence of ambient water quality conditions occurring within Suisun Bay, the fishing techniques in which recreational anglers are typically at anchor within shallow-water areas or along channel margins, and the observations of species such as striped bass and white sturgeon actively foraging over a wide range of ambient suspended sediment concentrations and fishing activity for the species that occurs at night.

Sand mining, and particularly the overflow plume, has the potential to result in localized temporary changes in the distribution of northern anchovy, within Central Bay that could affect their vulnerability to harvest in the commercial baitfish fishery. Northern anchovy occur at locations throughout Central Bay offering an opportunity for commercial fishermen to harvest anchovies from areas not affected by sand mining. The **AHFP study** found no evidence documenting adverse effects of sand mining on northern anchovy harvest within Central Bay.

Pacific herring are harvested from Central Bay during winter months. Herring spawning activity is distributed within the intertidal and shallow subtidal areas throughout Central Bay. The **AHFP study** found no evidence to suggest that sand mining activity adversely impacts the commercial harvest of either adult herring, or herring roe.

Bay shrimp are harvested from the Bay-Delta estuary at several locations within Central Bay, in the vicinity of Richmond and the Richmond-San Rafael Bridge and within the South Bay in the vicinity of Alviso. Sand mining does not occur in the vicinity of areas where bay shrimp are commercially harvested. Sand mining within Central Bay does not occur within the area where commercial bay shrimp harvest occurs.

Sand mining might directly or indirectly result in adverse impacts to recreational opportunities if important fishery areas were not avoided during dredging events. BCDC permit restrictions as to where dredges can operate are currently in place to avoid recreational fishing grounds identified by the DFG. All operations are subject to this permit requirement with the exemption of permit #1-95 for RMC in Middle Ground Shoal. It is anticipated this permit restriction will continue to be incorporated where needed.

Impact Analysis

All operations shall follow the conditions of the current BCDC permits, which require the operations consult with DFG and avoid interference with popular fishing areas and recreational boating and fishing activities, and that sand mining on weekends and holidays will not conflict with these activities. This applies to all operators. This provision is currently required in all the operations' BCDC permits (except for RMC Suisun Bay Middle Ground Shoal).

To extend the acceptance of Reclamation Plans past the expiration of the current Permit (see **Table 1**) the Permit must be reissued and the same, or parallel restrictions similar to the current protections, substituted. The operator must secure a valid extension of the Permit prior to the expiration of the current Permit and present it to the SMGB for acceptance.

XV. TRANSPORTATION/TRAFFIC

Environmental Setting

There are no significant transportation or traffic issues associated with bay sand dredging operations or Reclamation Plans.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| Would the project: | | | | |
| a) Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|---|--------------------------------------|---|------------------------------------|-------------------------------------|
| management agency for designated roads or highways? | | | | |
| c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Result in inadequate emergency access? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Result in inadequate parking capacity? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Reclamation plan approval would not result in any change in traffic or on circulation. No significant impact on traffic or circulation will result from the approval of Reclamation Plans for the sand dredging operations.

Impact Analysis

No mitigation is required for traffic impacts.

XVI. UTILITIES AND SERVICE SYSTEMS

Environmental Setting

There are no solid waste and/or wastewater disposal, or water supply issues associated with the bay sand dredging operations or Reclamation Plans.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|------------------------------------|-------------------------------------|
| Would the project: | | | | |
| a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| e) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| g) Comply with Federal, State, and local statutes and regulations related to solid waste? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Approval of Reclamation Plans for the on-going sand dredging operations would not result in any change to the provision of or need for solid waste and/or wastewater disposal, or on water supply demands. No significant impact on public services and utilities will result from reclamation plan approval.

Impact Analysis

No mitigation for utilities or service systems is required.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE

Environmental Setting

A large number of factors affect habitat quality and availability and the population dynamics of fish and macroinvertebrates inhabiting the Bay-Delta estuary. Sand mining has the potential to affect fish and macroinvertebrates through various processes including entrainment into the hydraulic suction head, changes in the short-term localized distribution of organisms as a result of behavioral avoidance of the overflow plume, benthic disturbance, and localized changes in water depth from areas where mining occurs at a rate exceeding short-duration sand replenishment.

| | Potentially Significant Impact | Less Than Significant with Mitigation Incorporation | Less Than Significant Impact | No Impact |
|--|--------------------------------------|---|-------------------------------------|-------------------------------------|
| a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Discussion

Quality of the Environment, Fish and Wildlife Populations and Examples of California History and Prehistory

The Biological Resources Impact Section discusses the possible impact of the sand dredging activities on the environment as it affects fish, wildlife populations, and endangered and rare species and found no substantial impact would occur with mitigation. No additional impact could be incurred by the approval and implementation of the Reclamation Plans.

Cumulative Impacts

Sand mining within the Bay-Delta estuary results in individually insignificant incremental effects on subtidal habitat quality and availability, habitat usage, and entrainment mortality for fish and macroinvertebrates through localized microhabitat scale, temporary changes in current patterns and bathymetry, behavioral avoidance and the change in distribution of sensitive fish species within localized areas where increased suspended sediment concentrations occur as a result of benthic disturbance and the overflow plume, localized benthic disturbance and short-duration changes to species composition and abundance of species within an area following a mining event, and entrainment of fish and macroinvertebrates into the hydraulic suction head during sand mining. Analysis of the available information collected and evaluated as part of the **AHFP Study** indicated that these incremental effects associated with sand mining typically were localized within relatively small areas of the subtidal habitat within the Bay-Delta estuary, typically have short duration and occur intermittently, and the magnitude of the incremental effects are small. There was no evidence from the investigations that these incremental effects would individually result in a significantly impact on the subtidal habitat quality, availability, or habitat function within the Bay-Delta estuary.

The **AHFP study** compared the volumes of material involved in sand mining to maintenance dredging and discussed the impacts of each process.¹⁹ The USACOE is responsible for maintaining shipping channels, in addition to a number of private dredgers that remove sediment deposits from shipping channels and ports under contract. Maintenance dredging within the Bay-Delta estuary is managed and regulated through USACOE permits. Material removed during maintenance dredging is subsequently disposed at several locations within the Bay-Delta estuary. Disposal of dredge material also occurs within nearshore coastal waters, in addition to upland disposal, where dredge material is utilized to enhance levees, and, in recent years, as part of habitat restoration projects within the delta, Suisun Bay, San Pablo Bay, and San Francisco Bay.

Maintenance dredging differs in several important aspects from sand mining. During maintenance dredging, a substantial amount of the sediment is relocated and returned to the Bay-Delta estuary, while commercially mined sand is completely removed from the system. Maintenance dredging also typically includes the removal of sediments having a high concentration of mud, silt, clay, and other fine-grained material, while sand mining selectively occurs within those areas where the percentage of fines within the sand deposit is low.

Information was summarized on annual maintenance dredging activity within the Bay-Delta estuary for the period 1991 through 2002 (EPA et al. 2002; DMMO 2002²⁰) on maintenance dredge disposal within the Bay-Delta estuary as shown in the table below. Based on these records, maintenance dredging activity has averaged approximately 2 million cy of material per year, totaling approximately 28 million cy of material over the 12 year period from 1991 through 2002. The majority (approximately 70 %) of maintenance dredge material disposal has occurred within Central Bay at the Alcatraz disposal site.

¹⁹ See also AHFP Study, section 8.0.

²⁰ See literature cited, AHFP Study

Sand mining within the Bay-Delta estuary in recent years has averaged a of approximately 1.5 to 1.9 million cy per year. The cumulative volume of sand and other substrate material affected by the combination of sand mining and channel maintenance dredging is approximately 3.5 to 3.9 million cy per year.

Additional analysis has been conducted to evaluate whether individual, albeit insignificant, effects associated with sand mining activity could contribute incrementally to the human-caused impacts of other projects and activities, as well as the impacts of naturally occurring changes that affect subtidal habitat conditions within the estuary, to result in significant cumulative effects. Potential cumulative effects evaluated include:

- Sediment dynamics within the estuary are affected by a variety of factors and physical processes, including historic hydraulic mining, changes in land practices, channel and levee stabilization, island reclamation, development of water impoundments and changes in hydrologic conditions occurring within the Sacramento and San Joaquin River systems, maintenance dredging and material disposal, and commercial sand mining. These and other factors individually and cumulatively affect sediment dynamics, sediment quality and grain size, the distribution of sediments within the estuary, and temporal and spatial patterns of sediment accretions and depletions. Therefore, the evaluation of this subject has not identified cumulative impacts associated with sand mining;
- Comparison of bathymetric survey results using data sets between 1955 and 2003 demonstrate temporal patterns of sediment accretions and depletions, and corresponding changes in water depth that would affect subtidal habitat conditions for fish and macroinvertebrates are typically within the range of plus or minus 10 feet. Despite the sand that has been mined commercially by dredge from the estuary over the last seven decades, sand supplies persist in the areas mined. The sand mining has not resulted in areas where sand has been completely removed from the system to bedrock or resulted in changes in water depth or subtidal habitat conditions that individually, or in combination with other factors, significantly degraded subtidal habitat conditions for fish and macroinvertebrates within the estuary. Therefore, the evaluation of this subject has not identified cumulative impacts associated with sand mining.
- Sediment budgets and the supply of sediments to the Bay-Delta estuary have been altered by the construction of upstream impoundments that trap sediments. Channel stabilization using riprap protected levees and changes in land use practices have individually and cumulatively reduced and altered sediment erosion processes and the supply of sand and other sediments entering the estuary. Other land use activities such as land use development and agriculture may have offset some of those losses of sediment in the river systems. A reduction in sediment supply, in combination with commercial sand mining, may result in the long-term depletion of sand resources within the area. However, to date, that sand continues to deposit and accumulate within the navigation channels of Suisun Bay, Middle Ground Shoal, Carquinez Strait, and further downstream within Central Bay suggests that the supply of sand and transport mechanisms are at a level exceeding the current rate of sand mine sand commercially by dredge. Therefore, cumulative impacts associated with sand mining are not anticipated.
- Ecosystem restoration programs are currently being planned and implemented to enhance the availability of shallow-water habitat within the Bay-Delta estuary. The shallow-water habitat areas are located along channel margins, and within existing

reclaimed islands characterized by mixed substrate, composed of fine-grained sand, silt, clay, and mud. Sand mining within the navigation channels and deeper water areas within Suisun Bay, Middle Ground Shoal, Carquinez Strait, and Central Bay would not be expected to directly affect sediment dynamics within the shallow-water areas where habitat enhancement projects are being developed. Comparison of bathymetric charts over the period 1975 and 2001 showed little change in shallow-water areas within the Suisun Bay complex and Central Bay despite frequent and extensive channel maintenance dredging and sand mining activity within these areas. The combination of the effects of sand mining and channel maintenance dredging, which is limited to deeper higher velocity main channel locations, would not be expected to significantly affect the protection or enhancement of shallow-water habitat. Therefore, the evaluation of this subject has not identified cumulative impacts associated with sand mining;

- The potential for cumulative impacts to result from sand mining, in combination with maintenance dredging and other activities, on shoreline characteristics within Central Bay has been evaluated. There has been specific focus on accretions and depletions of sand deposits near Crissy Field, in addition to subtidal habitat for California halibut and other species in the vicinity of Point Knox Shoal, Presidio Shoal, and Alcatraz Shoal, where sand mining within Central Bay occurs. Comparison of bathymetry within Central Bay did not detect changes in water depth profiles that would significantly affect subtidal habitat conditions or the availability of shallow-water habitat along the margins of Central Bay. The sediment dynamics within Alcatraz, Presidio, and Point Knox shoals are spatially complex, showing patterns of both accretions and depletions of sediment, and corresponding water depths, on a microhabitat scale. To date, the available information from Central Bay is characterized by high spatial and temporal variability, but does not provide evidence that sand mining within the deeper water high velocity areas of Central Bay is resulting in a significant individual or cumulative impact to subtidal habitat quality or availability. Sand mining within shallow areas of Central Bay (e.g., less than 30 feet deep), characterized by low water velocities, and reduced sand replenishment, has the potential to alter subtidal habitat conditions that may adversely affect habitat quality and availability, and should be avoided. Because such areas are avoided pursuant to permit conditions imposed on sand mining, it will not result in cumulative impacts;
- The sediment budget and transport rate of sediment into Central Bay from nearshore coastal waters has not been quantified, and very little information is available regarding the dynamic processes affecting sand supply and transport into and within Central Bay. To date, no cumulative impacts have been identified;
- Changes in water depth immediately following a sand mining event, using a stationary pothole method and to a lesser extent trolling result in temporary localized (microhabitat) changes in current patterns. However, there is no evidence to suggest that sand mining results in larger regional changes in current patterns that would affect habitat quality or the distribution of various fish and macroinvertebrates within the estuary. The duration of time that benthic changes resulting from sand mining remain is a function of water velocities and sand transport within an area. In high velocity areas, characterized by transient bed forms (sand waves) and rapid sand replenishment, benthic disturbance may be detected for only a short period (e.g., days or weeks) while disturbance features may persist over a longer period in areas where water velocity is low, and sand transport and replenishment rates are reduced. To date, however, no information has been found that documents significant adverse individual or cumulative impacts to subtidal benthic species or habitat use and function resulting from microhabitat scale changes to substrate following sand mining;

- There is no evidence to suggest that sand mining has contributed to either an incremental or cumulative effect on habitat quality by removing sand deposits and exposing additional bedrock outcroppings within the Bay-Delta estuary;
- Maintenance dredging and sand mining have contributed to cumulative changes in the channel characteristics (water depth) within the Suisun Bay complex. However, the incremental contribution of sand mining mine sand commercially by dredge to these changes is not considered significant since channel maintenance dredging would be performed to maintain navigation within the channel areas independent sand mining activity. Further, there no specific cumulative impacts have been identified in relation to this subject;
- Disposal of substantial volumes of sand and fine-grained sediments resulting from channel maintenance dredging within various areas of the Bay-Delta estuary results in localized, temporary, intermittent increases in suspended sediment concentrations, in addition to localized changes in sediment grain size distribution and deposits within those areas where dredge material disposal occur. Dredge material disposal within these areas, in combination with localized changes in suspended sediment concentrations resulting from a sand mining overflow plume, would be expected to alter habitat conditions and the abundance and distribution of sensitive fish and macroinvertebrate species within these areas. The effects of sand mining and dredge material disposal on suspended sediment concentrations, and the resulting behavioral response and change in distribution and habitat use by sensitive fish and macroinvertebrate species, are localized, intermittent, and temporary and are not considered significant, individually or cumulatively. Sensitive species, such as northern anchovy, would be expected to avoid areas where suspended sediment concentrations were adverse, returning to the area after dissipation of the suspended sediment plume resulting from either sand mining or dredge material disposal;
- Increased suspended sediment concentrations resulting from the combination of sand mining and dredge material disposal, in combination with naturally-occurring increases in suspended sediment concentrations within the estuary, would be expected to result in short-duration (e.g., minutes to hours) reductions in feeding activity by some species of fish and macroinvertebrates but such impacts are not considered significant. No data are available, however, on the potential biological effects of short duration changes in predator-prey relationships, growth or survival of species inhabiting the estuary. Thus, no cumulative impacts have been identified;
- Sand mining is not expected to contribute to cumulative effects on exposure of fish and macroinvertebrates to elevated concentrations of contaminants, or exposure to localized areas having depressed dissolved oxygen concentrations;
- Sand mining and maintenance dredging result in benthic disturbance and localized changes in species composition and abundance of benthic macroinvertebrates. Benthic areas are rapidly recolonized by macroinvertebrates following disturbance. Frequent benthic disturbance resulting from sand mining, maintenance dredging, and natural processes would be expected to benefit the spread and colonization of disturbed benthic habitat by non-native invasive species. The cumulative contribution of sand mining and maintenance dredging to changes in the benthic macroinvertebrate community would be small for those areas frequently disturbed by natural processes; the areas where most sand mining occurs;

- No significant individual or cumulative effects of sand mining on subtidal benthic macroinvertebrate communities have been identified. The potential for such impacts is further limited by the fact that mining activity is concentrated within those areas of the Bay-Delta estuary characterized by relatively high water velocities, relatively coarse grained sand having a low percentage fines, sand replenishment and transport, and frequent natural disturbance. Areas within the main navigation channel within Suisun Bay, adjacent to Middle Ground Shoal, and within Carquinez Strait, in addition to areas within Alcatraz, Presidio, and Point Knox shoals have been identified that generally meet these criteria. These include the areas where sand mining activity currently occurs; and
- A variety of fish and macroinvertebrates, including planktonic eggs and larvae and juvenile lifestages, have been found to be vulnerable to entrainment into a suction head similar to that used in both sand mining and maintenance dredging. Although no studies have been conducted within the Bay-Delta estuary to quantify entrainment vulnerability and/or entrainment mortality associated with sand mining, results of investigations conducted within the Pacific Northwest and elsewhere have demonstrated the risk of entrainment. In addition, fish and macroinvertebrates inhabiting the Bay-Delta estuary are vulnerable to entrainment at a large number of industrial, municipal, and agricultural water diversions. Although detailed quantitative data on entrainment from individual and cumulative sources are not available, a comparison of water volumes entrained during sand mining and power plant cooling water system operations within the Bay-Delta estuary demonstrate that the magnitude of entrainment associated with sand mining is small. Although any entrainment resulting from sand mining would contribute to the cumulative mortality rates associated with entrainment for various fish and macroinvertebrate species inhabiting the estuary. Analyses of fish and macroinvertebrate entrainment as a result of power plant cooling water system operations did not provide evidence suggesting that entrainment mortality resulted in significant adverse impacts to the population dynamics and abundance of fish and macroinvertebrates within Suisun Bay and the Delta or San Francisco Bay. Given the small incremental contribution of entrainment potentially resulting from sand mining to the overall entrainment-related mortality of fish and macroinvertebrates, any contribution of sand mining is not expected to result in significant cumulative impacts to the local or regional population abundance of species inhabiting the estuary.

In conclusion, the AHFB Study has identified no significant cumulative effects resulting from the combination of individual, albeit insignificant impacts, of sand mining in combination with the impacts of other projects and activities.

However, long term, cumulative effects of sand mining could occur, and , if so, could also be beyond that detected by current methods and/or indicated by the studies available to date.

Adverse Effect on Humans

There are no impacts to human populations associated with the bay sand dredging operations or the approval and implementation of the Reclamation Plans.

Impact Analysis

The information collected in the **AHFP study** indicates no significant impact, individual or cumulative, from sand mining in the Bay-Delta estuary has been detected. Given the complexity of environmental factors and conditions present, the bio-geographic specificity of many of the available studies present in the literature, and technical limitations, some of the

possible long term impacts resulting from sand dredging operations may currently be beyond detection.

A number of areas were identified for which the existing available information does not detect any impact at this time, but could eventually be detected as a cumulative impact over a long time period. The **AHFP study**, Section 9.0, identifies additional areas of information, comprising supplemental studies to that available in the existing literature, that should be considered in completing any further analysis of potential environmental impacts of marine sand mining in the Bay-Delta. These additional areas would be considered in a separate environmental analysis prior to approval of any of these Reclamation Plans past the proposed projects' term-limits.

- Mitigation will require that all of the Reclamation Plans considered in this project are limited in term to expire on July 1, 2008. Time extension of approval of any of the Reclamation Plans would further evaluate cumulative and long-term impacts, particularly in the area of substrate monitoring and accretion and depletion of the substrate.
- Additional lease areas shall not have new Reclamation Plans approved without an independent environmental analysis.
- Mitigation will require that cumulative volumes of sand dredged will not significantly increase during the approval period for the term limited Reclamation Plans without an independent environmental analysis.

4. TABLE 1

5. SURFACE MINING AND RECLAMATION PLANS FOR BAY-DELTA MARINE SAND DREDGING OPERATIONS

Hanson Suisun Bay Middle Ground Shoal
RMC Suisun Bay Middle Ground Shoal
Jerico Suisun Bay Middle Ground Shoal
Suisun Associates Suisun Bay Carquinez West & East
RMC Alcatraz Sand Shoal
Hanson Point Knox Shoal
Hanson Alcatraz, Presidio, Point Knox
RMC Carquinez Straits
Hanson Point Knox South
Hanson Alcatraz South Shoal

ATTACHMENT A
